ELECTRICAL WEST

FEB 26 1945

Annual Review and Forecast • February 1945 • 25c

Electrical Living...

BIGGER BARGAIN THAN EVER!

SOUTHERN CALIFORNIA Edison

The low cost of electrical service has been an important factor in the constantly growing use of electric ranges, refrigerators and other household appliances.

Edison rates, always among the lowest in the entire nation, have been reduced many times in recent years—twice since 1939. The advertisements shown here point out that even though other living costs have risen steadily, the continued low cost of Edison service makes electrical living one of today's biggest bargains.

Appearing in newspapers and magazines throughout Edison-served territory, these and similar advertisements are paving the way for future sales of appliances, lighting equipment and adequate wiring.

Southern California Edison Company Ltd.

"THIS IS PLENTY, THANKS"
Southern California
ELECTRICITY
OTHER LIVING COSTS
GENERAL COST OF LIVING
COST OF LIVING
COST OF ELECTRICITY
"LIVING COSTS TOOK THE HIGH ROAD BUT I TOOK THE LOW ROAD"
On the "Low Road" since 1915
Since the first World War, housing, food, clothing and other living costs have gone up and up . . . farther and farther along the "high road." But Reddy Kilowatt—your dependable servant, electricity—has continued to march steadily down the "low road." Edison electric rates have been reduced many times since 1915. Today Reddy Kilowatt's services cost half as much as during World War I. You probably use much more electricity in your home now, *but your electric dollar buys more, too!*
Edison
Here's one living cost that
STAYING DOWN
You don't have to be reminded that food, housing, clothing – nearly every living expense – have been going higher and higher during the last several years. But have you noticed that the price you pay for electrical service *has stayed down?* You probably are using more electricity in your home than ever before, but your electric bills are about the same – perhaps even lower. Edison electric rates have been reduced *twice* since 1939 *and many times in the previous ten years!*
Edison
COST OF ELECTRICITY
ight eater!
Kilowatt does in your home ng, operating your electric re providing light—you might ex the family budget. But Reddy le—only a few pennies a day about 28% since 1939. Edison at is why the average electric though most families use more dollars go a long way!
Edison
TODAY'S BIGGEST BARGAIN IS Electricity
still are Bargains!
Most things cost more today than before the war, *but not Edison electricity!* Even though you probably use more electricity in your home now than ever before, you pay no more for a kilowatt-hour of service. Edison rates have been reduced twice since 1939, while other living costs have risen about 28%! When you consider that one penny's worth of Edison electricity will operate your radio for six hours . . . or toast fifteen slices of bread . . . or do the family washing . . . you can see that you really get a bargain every time you use Reddy Kilowatt's services!
Edison

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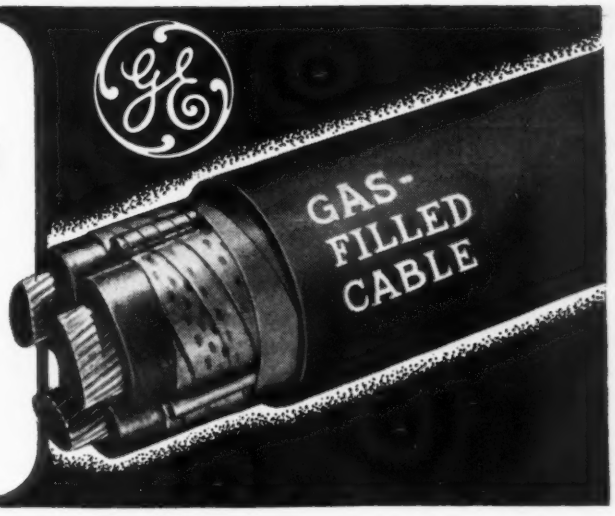
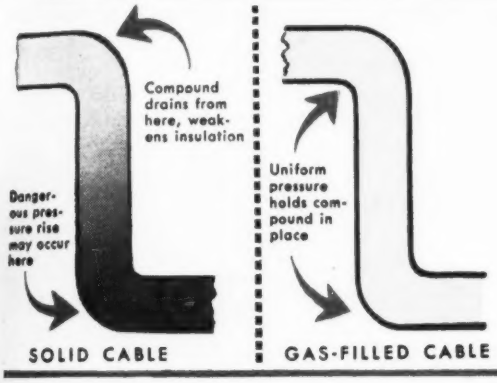
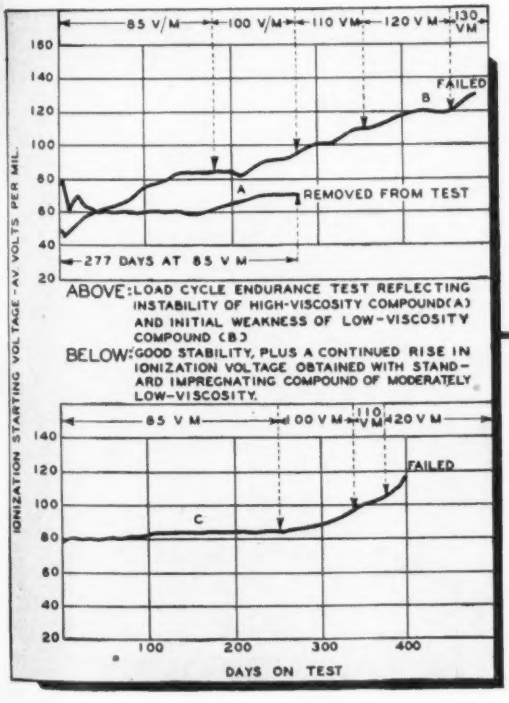
What COMPOUND VISCOSITY has to do with the service strength of G-E gas-filled cable




Compound drains from here, weakens insulation
Danger-ous pres-sure rise may occur here
Uniform pressure holds com-pound in place
SOLID CABLE
GAS-FILLED CABLE

VISCOSITY of the impregnating compound in solid-type cable must be objectionably high, if migration is to be avoided. Migration of compound results in dry insulation at the top of a grade, and excessive pressure at the foot of steep grades or vertical risers. In gas-filled cable, the gas spaces and the uniformity of pressure throughout greatly reduce this migratory effect. Profile no longer sets the lower limit for compound viscosity. Vertical risers of any height compatible with the tensile strength of the cable or supports are feasible.



LOAD-CYCLE ENDURANCE TESTS, conducted on sample cables covering a wide range of viscosities, have given us significant facts on their ultimate dielectric strength. At the start, the heavy compounds (Saybolt 1000 at 100 deg C) show high ionization voltage, but no *increase* in stability occurs (A). Thin compounds, on the other hand, start very poorly, even though they show a continual rise in stability due to automatic grading and "X-wax" formation within the voids (B).

THE STANDARD IMPREGNATING COMPOUND used in G-E mass-impregnated gas-filled cable (Saybolt 100 at 100 deg C) does not drain objectionably and shows good stability right from the start. Yet it has sufficient mobility to permit automatic grading and self-healing action. In the tests (see chart) ionization was extinguished at each upward voltage step until 120 volts per mil was applied. Only after 16 days at this extreme level did failure occur.

Taken together with the self-supervising feature, which warns of sheath damage, this *self-protecting ability* of mass-impregnated gas-filled cable helps explain why G.E. regards it as tomorrow's universal cable-type, within its recommended voltage ranges. *General Electric Company, Schenectady 5, N. Y.*

RATINGS: LOW-PRESSURE TYPE, 10 TO 40 KV; MEDIUM-PRESSURE TYPE, 40 TO 69 KV

GENERAL ELECTRIC

501-25-1200

BUY ALL THE BONDS YOU CAN—AND KEEP ALL YOU BUY

ELECTRICAL WEST

VOL. 94 FEBRUARY, 1945 NO. 2

Fourth Year of War 69

Highlights of electric utility operations in the Far Western States; comparisons of Western with national operations figures

Western Utilities Plan for 1945 72

The construction record for 1944; scheduled plant additions for present year as reported by managers and chief engineers

Measure of Your Market 90

Western utilization men look to postwar; plan merchandising policies; examine personnel needs; study population shifts

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Cover: Boeing B-29 Superfortress; Grand Coulee Dam; U. S. Army Signal Corps maneuvers; Bonneville tower.

CHANGE OF ADDRESS

Circulation Manager,
Electrical West,
68 Post St.,
San Francisco 4, Calif.

Please change my address

From .....

To .....

Signed .....

Preview

Miscellany for March

If the statistics in this issue choke you, surely the diet will be balanced in March, for the schedule calls for something for everyone in that number. (The editors recommend, nevertheless, that these statistics be digested too, for in their preparation it was surprising what an insight they give to the business and future of this industry.)

In the lead will be a penetrating view of the current situation by a keen eyed observer, F. F. Letchfield, engineer-banker with a record for accurate diagnosis behind him.

Reverse-cycle—or the heat pump—talked about glibly, what is its true performance and potential? Two of the men best qualified in the West to answer will do so—Frank Jordan of Westinghouse and Howard Douglas of Southern California Edison.

Praise be, at last it is hoped that transformer phase relations, over which ELECTRICAL WEST has stubbed its toes lately, will be clarified by engineer F. V. Gillum in a way which should interest all engineers and operating men, particularly those new to the whole thing.

Still on the track of truck body designs for postwar, an article on them is anticipated from Fred Beach of Northwestern Electric.

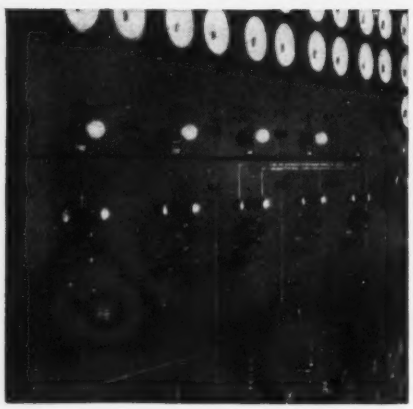
Dealers will find interesting the results of an independent survey of appliances and preferences of various groups in Portland. Because it may give clues to the selling trends of the future in any of the West's war boomed cities, it should be read and thought about.

What the Western Merchandise Market reveals in the way of hopes and news will likewise be reported in the March issue. Some merchandise may appear, some plans may be announced, some distribution changes may appear. Keep tuned for significant reports from this sales front.

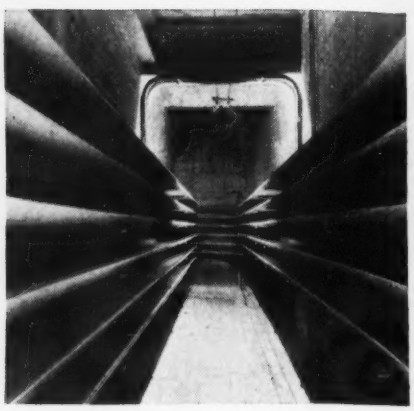
Because the National Electrical Code is up for revision this year, there should be one or two important articles on changes proposed and results of war experience on alternate materials that may give them justification for a permanent place in future wiring.

HATS OFF TO WESTINGHOUSE RETAILERS AND
THEIR SERVICE MEN WHO HAVE KEPT
YOUR ELECTRIC APPLIANCES ON THE JOB
TUNE IN: JOHN CHARLES THOMAS, SUNDAY 2:30 EWT., N.B.C.
HEAR TED MALONE, MON. TUES. WED. EVES., BLUE NETWORK
In the three years since Pearl Harbor, Westinghouse retailers and their service people have, indeed, rolled up a notable record. And as a well-deserved tribute to them we are running this advertisement in full color in the January 20th issue of Collier's and the January 20th issue of The Saturday Evening Post.
WESTINGHOUSE ELECTRIC & MFG. CO.
Appliance Division • Mansfield, Ohio
Plants in 25 Cities . . . Offices Everywhere
30 MILLION PRE-WAR
Westinghouse
ELECTRIC HOME APPLIANCES
YOUR PROMISE OF STILL FINER ONES TO COME

Safeguard Future

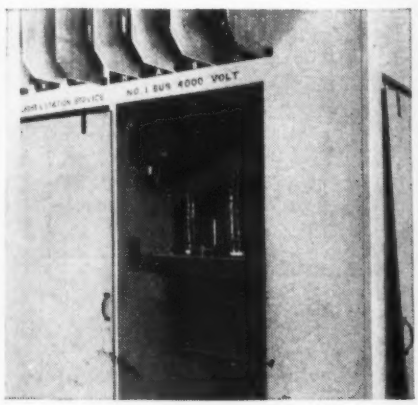


ASBESTOS EBONY is a permanent, inorganic mineral product. It won't rust, rot, shrink, crack or buckle. Impervious to water, gas, oil, and ordinary chemicals. Has high dielectric strength and insulation resistance.



TRANSITE CABLE TRAYS are made of an incombustible, strong, corrosion-resistant material. Designed to support cables. Transite Cable Trays save space, provide greater accessibility, cost less to install and need no maintenance.

SEALING COMPOUNDS. J-M makes several—Duxseal, Pakseal, Tranolseal and Uniseal, each one with special characteristics. All are easily workable at 35° F., with no slump at 300° F. They won't harden materially when exposed to air.



TRANCELL sheets are lightweight, strong, fire-resisting . . . excellent for cell structures, doors, and partitions. J-M Trancell conserves space, reduces floor loading, saves cost, since equipment can be bolted directly to it.

Construction...

PLAN TO USE THESE *Safer* ELECTRICAL MATERIALS

WHEN the green light "Go Ahead!" flashes for plant renewal and future expansion . . . *be ready to put these dependable Johns-Manville Electrical Materials to work for you.*

During the past critical years of sustained peak loads, J-M materials have helped engineers avoid waste and cut costs . . . by savings on installation expense, by reduced fuel consumption. And J-M Electrical Materials help further by providing an *extra* margin of safety!

Developed in the extensive Johns-Manville Research Laboratory, J-M-Electrical Materials are backed by the know-how acquired through 87 years of experience in solving construction problems.

* * *

All J-M Electrical Materials are described in Catalog GI-6A. For your copy, write: Johns-Manville, 22 E. 40th Street, New York 16, N. Y.

CABLE FIREPROOFING. Niagrite-Asbestoment, consisting of Niagrite, a commercially pure asbestos felted tape with or without reinforcement, and Asbestoment, an efficient refractory material, provides fireproof protection for cables.

TRANSITE CONDUIT and KOR-DUCT, made of asbestos fiber and cement, are fireproof, highly resistant to corrosion, electrolysis, and soil chemicals . . . are readily installed. Transite Conduit needs no concrete envelope underground.

Other Johns-Manville Products for the Electrical Industry

Chemstone
Electrobestos
Asbestos Tapes
High Temperature Insulation
Refractories
Transite Partitions
Acoustical Materials
Friction Tapes
Splicing Compounds
Transite Asbestos Sheets
Packings
Built-Up Roofing
Industrial Flooring
Transite Pressure Pipe

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville Electrical Materials

This little tag carries a lot of weight

GET THIS FREE CHART FOR YOUR MEN

THE "FOUR FIRSTS" OF MOTOR MAINTENANCE

Handy wall chart for your maintenance department, stressing the four most common causes of motor failure and the precautions to take against them. Write for Chart SA-783. Westinghouse Electric & Mfg. Co., P. O. Box 868, Pittsburgh 30, Pennsylvania.

WESTINGHOUSE

HERE'S WHAT IT MEANS IN KEEPING YOUR ELECTRICAL EQUIPMENT AT MAXIMUM PRODUCTIVE EFFICIENCY

Whenever you need major electrical repairs in your plant—or repair and overhaul of equipment outside your plant—remember this tag. It's the sign of a service that will get your machines back on the job quicker, assure longer life on repaired apparatus.

Only a piece of paper, you may say. But back of it is a nationwide organization equipped to render a type of service that only a leading electrical manufacturer can offer.

Here's what Westinghouse "Factory-Proved" Maintenance Service means in terms of *better* repairs, *longer-lasting* repairs:

EQUIPMENT of the most modern type has been used in the reconditioning and repair of the job.

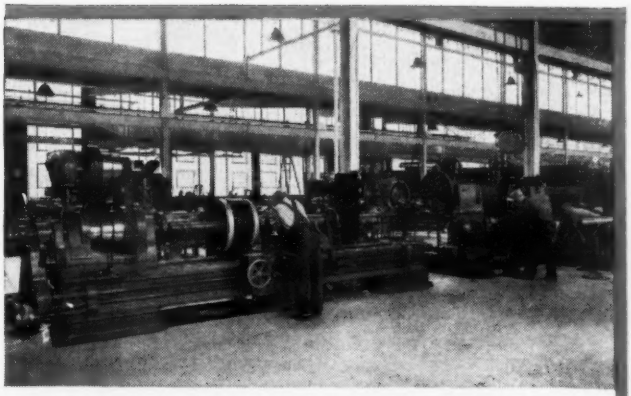
FACTORY-PROVED METHODS and materials have been employed.

PERSONNEL trained in factory methods, supervised by men with years of experience, have performed the repair job.

ACCURATE TESTING—the repaired apparatus has been carefully tested to factory specifications.

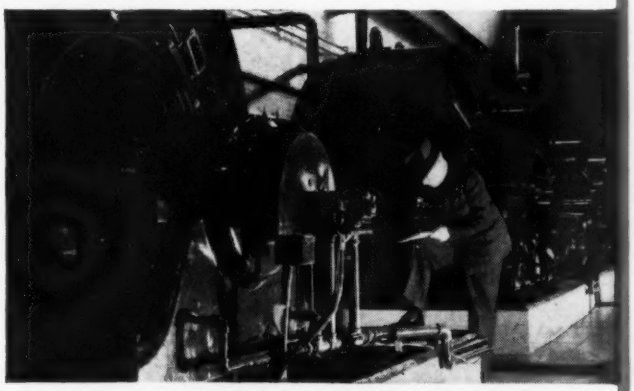
SERVICE GUARANTEE—the repairs on the apparatus carry the standard Westinghouse guarantee.

Westinghouse "Factory-Proved" Maintenance is a nationwide electrical repair service—with local branches as near as your telephone. Just call your nearest Westinghouse office, and explain the type of service you need. Westinghouse Electric & Mfg. Co., P. O. Box 868, Pittsburgh 30, Pennsylvania. J-96000



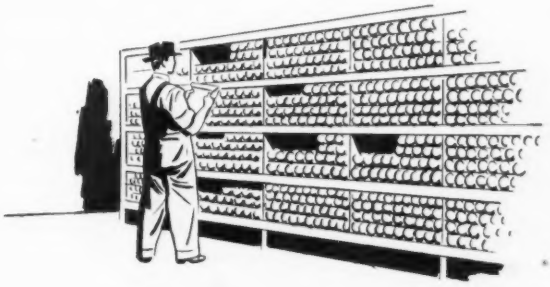
For Longer-Lasting Repairs Outside Your Plant

There is a Westinghouse repair plant near you to give you prompt "Factory-Proved" service on electrical repairs. Check the list on this page to see what "Factory-Proved" service means.



For Faster Repairs in Your Own Plant

. . use Westinghouse Field Engineering and Service. Factory-trained engineers are available to diagnose trouble, and work with your own people to speed up repairs. Portable field equipment assures accurate results.



For Prompt Service on Renewal Parts

. . . call your Westinghouse District Sales Office. Ample stocks of genuine Westinghouse parts are available at all times. To speed minor repairs, build up your own stock of parts most subjected to wear.

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

Maintenance Service

More Light on the TRUE cost of FLUORESCENT LIGHTING

in stores, offices, schools and public buildings

THERE is but one way to "figure" *any* lighting system: The *total* cost, fully installed and ready to operate.

"Fixture" cost is but part of the total cost. Unless the *composite* costs of conduit, wire, wiring and other installation and mounting materials are also taken into full account, the *true* cost may be a sad surprise.

In designing fluorescent lighting systems, The Miller Company has done something about that fundamental point:

1. **The number of supports needed to hang Miller lighting equipment has been reduced 50 to 75%.**
2. **Moving of outlets has been minimized or, in many cases, *eliminated*.**
3. **Wiring costs have been reduced up to 50%.**
4. **Conduit and conduit fitting costs have been reduced up to 80%.**
5. ***New ceiling furring systems, made possible by the patented Miller Bracket, provides a stronger structural ceiling, simplifies and speeds up the entire construction.***

To the foregoing brass tacks, add these facts:

1. **Miller Fluorescent Lighting Systems are backed by 100 years' experience with all proven light sources.**
2. **These systems present new vistas in esthetic design and functional planning.**
3. **They are amazingly versatile and fit the picture as single units or in blocks, geometric patterns and even as light strips "by the mile".**
4. **Their wide range of plastic and glass plates, prismatic glass lenses and metal or plastic grilles harmonize with any interior—or, in their many possible arrangements, suggest themes around which entire interiors may be planned.**

It all adds up to the simple GRAND total fact that calling a Miller Representative (they're in principal cities) may be your happy answer to a lot of problems!

THE MILLER COMPANY • MERIDEN, CONNECTICUT

ILLUMINATING DIVISION
Fluorescent, Incandescent
Mercury Lighting Equipment

OIL GOODS DIVISION
Domestic Oil Burners
and Liquid Fuel Devices

ROLLING MILL DIVISION
Phosphor Bronze and Brass
in Sheets, Strips and Rolls

WAR CONTRACTS DIVISION
War Materiel

MILLER
SINCE 1844

through Okonite-Callender Research . . .

OKOSHEATH PROTECTIVE COVERING FOR LEAD SHEATHS

OKOSHEATH PROTECTIVE COVERING is impervious to all corrosive agents likely to be encountered in underground ducts.

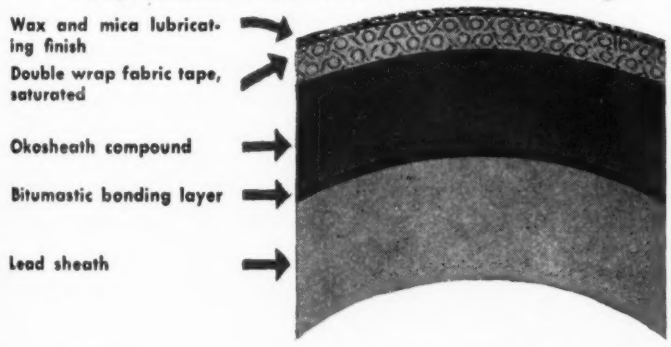
It possesses good electrical insulating properties. Insulation resistance measurements between lead sheath and ground have proved its permanent electrical insulating quality. Particularly desirable for use on large size single conductor cables which are likely to have heavy sheath currents.

Okosheath prevents mechanical injuries to the lead sheath that are impossible to avoid completely when handling and pulling. These are the points at which both corrosion and fatigue become concentrated.

FIELD TEST

A 150-foot length of Okosheath covered cable was installed in a standard duct system. This test length has been periodically removed from the ducts and reinstalled after careful examination and tests. Today, after more than ten years, the Okosheath Protective Covering is still in excellent condition although the outer fabric tapes show some deterioration because of the excessive pulling in and out of the duct.

Enlarged cross-section view of Okosheath Protective Covering



Natural rubber was generally used in the Okosheath compound until the shortage in our rubber supply occurred. Now Buna S synthetic rubber or Okoprene (made with neoprene) is used in the Okosheath compound. Tests indicate that results with Buna S or Okoprene are comparable with those of natural rubber. Okoprene is preferable because of its superior oil resistance and nonflammable quality while costing no more. The Okonite-Callender Cable Company, Inc. Executive Offices: Passaic, New Jersey.

Okosheath Quick Quiz

Q. What about cost?

A. Okosheath Covering is relatively cheap corrosion insurance. For a standard 3-conductor, 350,000 CM, 15,000-volt paper-insulated lead covered cable, the Okosheath covering adds about 20% to the cost.

Q. Is this expensive?

A. Not when you consider that Okosheath covering need only be applied in sections where corrosion is known to exist Compare it with the cost of a single lead sheath failure which involves the following items: locating trouble, withdrawing the defective faulty length, supplying a new cable, pulling in the new length and splicing it. This does not even consider revenue loss due to service interruptions.

Q. How much is the cable diameter increased?

A. Okosheath jackets are about ⅛″ thick and add approximately 0.250″ to the cable diameter.

Q. Is the current-carrying capacity of the cable adversely affected by the Okosheath Covering?

A. No, because of the increase in surface area.

OKONITE-CALLENDER

paper insulated power cables

3925

Chromy says

"Here's the name to hold to in range units"

It's a

CHROMALOX Tubular

GOODWILL BUILDER FOR YOU *because:*

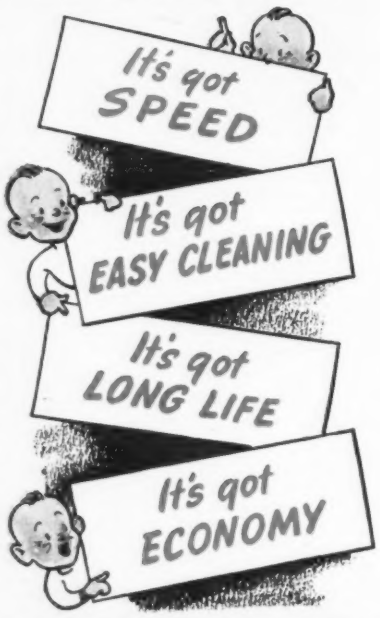
Cross section of Inconel sheathed tube shows how Chromalox design provides maximum contact surface, rigidly maintained. This means better cooking for longer time at lower cost for your Chromalox customers.

Chromalox Tubular Range units have been tested and approved in the most exacting laboratories in the world—the kitchens of America! Before the war, 30,000 ranges were equipped.

Famous Chromalox Tubulars will soon again be available.

Chromalox Superspeed and Heatflo—to fit any range—are available now.

EDWIN L. WIEGAND CO.
7540 Thomas Blvd., Pittsburgh 8, Pa.



on new ranges and for replacements

CHROMALOX

means ELECTRIC COOKING AT ITS BEST!

PRODUCTS

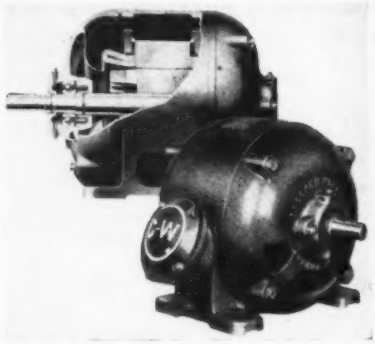
that are news

Stroboscope (200)

Communication Measurements Laboratory has developed a stroboscope, CML Model 1200, which it claims increases the range through which moving objects may be examined. Rotary speeds from 600 to 600,000 r.p.m. or vibrations from 10 to 10,000 c.p.s. can be "stopped" and studied, it is stated. The light source is mounted in a small probe at the end of a 5-ft. flexible cable and provision is made to operate the unit from external tuning fork or crystal standards, where extreme accuracy is required. A stable audio oscillator to secure accurate repetitive pulse rate and a light intensity control switch are provided, according to the announcement.

Motor (201)

Joshua Hendy Iron Works, Crocker-Wheeler Division has developed a motor claimed to combine the surplus capacity of the conventional open type motor with protection against dripping liquid and other foreign matter. This motor is rated 40° C rise, full load continuous duty, with a 15% service factor; is available at present in sizes up to and including the 284 frame. Mounting dimensions conform to NEMA standards. There are no openings in the frame or shields above the horizontal center line.



Terminal Block (202)

Paul Henry Co. has a new plastic terminal block, which it states is interchangeable with many standard types of AN terminal panels employing screw type lug fastenings. On this model a cam-action "bridge" element bears against the lugs or terminals to be interconnected. A self locking feature provides for snap-in contacts, holds contacts firmly in position and is released manually by lever. This block is said to be capable of withstanding a 3,000-volt a-c insulation breakdown test. Springs are tempered beryllium copper, silver plated.

Motor Drive (203)

Electrical Engineering and Mfg. Corp. has developed a fractional horsepower electric motor drive unit for cabin heater drive in the Douglas A-26. The unit is a light weight, continuous duty type, ½-hp., fan-cooled 7,000-r.p.m. motor equipped with right angle gear box and drive shaft. Gear ratio is 1 to 1; over-all efficiency, 70%. It is for use in a 28-volt system.

Question: What's the accuracy classification of this instrument transformer?

Type JW-1 current transformer, 5000 volts, for high-accuracy metering

Answer:

ASA Burden	B-0.1	B-0.2	B-0.5	B-2
ASA Accuracy Class	0.3	0.3	0.3	0.3

This means that with standard ASA burdens, the ratio correction factor and the transformer correction factor will be within the limits of the ASA accuracy class 0.3.

NEMA Burden	X	Y	Z
NEMA Accuracy Class	¼	¼	¼

This means that with standard NEMA burdens, the ratio error and the phase-angle error will be within the limits of the NEMA ¼ accuracy class.

How Accuracy Classification Helps You

IN the selection and application of instrument transformers, a thorough knowledge of the new ASA system of accuracy classification can help a great deal.

For example, different applications often require different transformer characteristics. A transformer that is satisfactory for metering purposes (highest accuracy up to 100 per cent of its current rating) may not be satisfactory for relaying purposes where the *overcurrent* characteristics (currents as much as 20 times normal) must be considered.

The new ASA accuracy standards have made possible the most precise method of selecting instrument transformers yet devised. All G-E instrument transformers are classified in accordance with these standards.

This enables you to select the transformer with the most suitable characteristics for the job to be done. *General Electric Company, Schenectady 5, N. Y.*

BUY ALL THE BONDS YOU CAN—*KEEP ALL THE BONDS YOU BUY*

GENERAL ELECTRIC

604-13-6400

FOR A BETTER UNDERSTANDING OF ACCURACY CLASSIFICATION

This publication explains the ASA accuracy standards for current and potential transformers and shows how they differ from the NEMA standards. Also, you will find this booklet a handy guide to the selection of G-E instrument transformers. Ask for your copy today. Address the G-E office nearest you.

HEADQUARTERS FOR ELECTRICAL MEASUREMENT

Customer's Choice?

Allis-Chalmers believes in the cooperative
of buyer preference—thus offers you not

☛ Among the questions which a manufacturer must decide in developing equipment for industry is to what extent it should be standardized.

☛ When practicable, standardization results in undeniable benefits by making possible a better product at a lower price. On the other hand, too rigid standardization may be unfair to the users of the equipment.

☛ Allis-Chalmers introduced standardized metalclad switchgear to America — and has standardized breakers dimensionally to fit in metalclad units.

☛ What Allis-Chalmers has *not* yet done is to restrict buyer choice of types of circuit interrupters available . . . either by price penalties or any other means.

☛ Back of Allis-Chalmers' policy on switchgear standardization is the sincere conviction that customer preference is tremendously important.

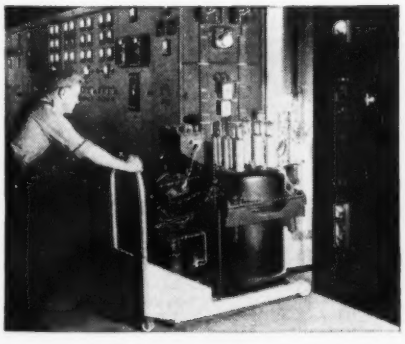
ALLIS AC CHALMERS

-Or Manufacturer's?

development of switchgear, along the lines one, but three types of circuit breakers.

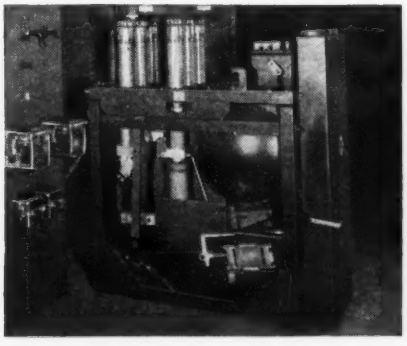
☛ By offering all three types of circuit interrupters for unrestricted buyer choice, Allis-Chalmers lets the customer bring to bear on evolution of switchgear his own knowledge of local conditions. Thus the circuit breaker (or breakers) offered tomorrow will be the result of cooperative development by manufacturer and customers today.

The 3 Types of Allis-Chalmers Circuit Breakers



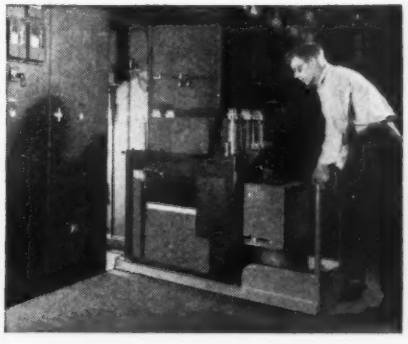
1 OIL CIRCUIT BREAKER

As offered by Allis-Chalmers, this breaker is the product of 40 years' development and research. It is "Ruptor"-equipped for low maintenance. High impulse strength and its desirable application in certain atmospheric conditions promise to keep the oil breaker a factor in the electrical industry.



2 AIR BLAST BREAKER

First commercially introduced to this country by Allis-Chalmers six years ago, the air blast breaker gives unexcelled all-around performance. Arcing time is always within one-half cycle, with longer contact life as a result. The breaker is ideally suited for repetitive duty at high currents.



3 MAGNETIC AIR BREAKER

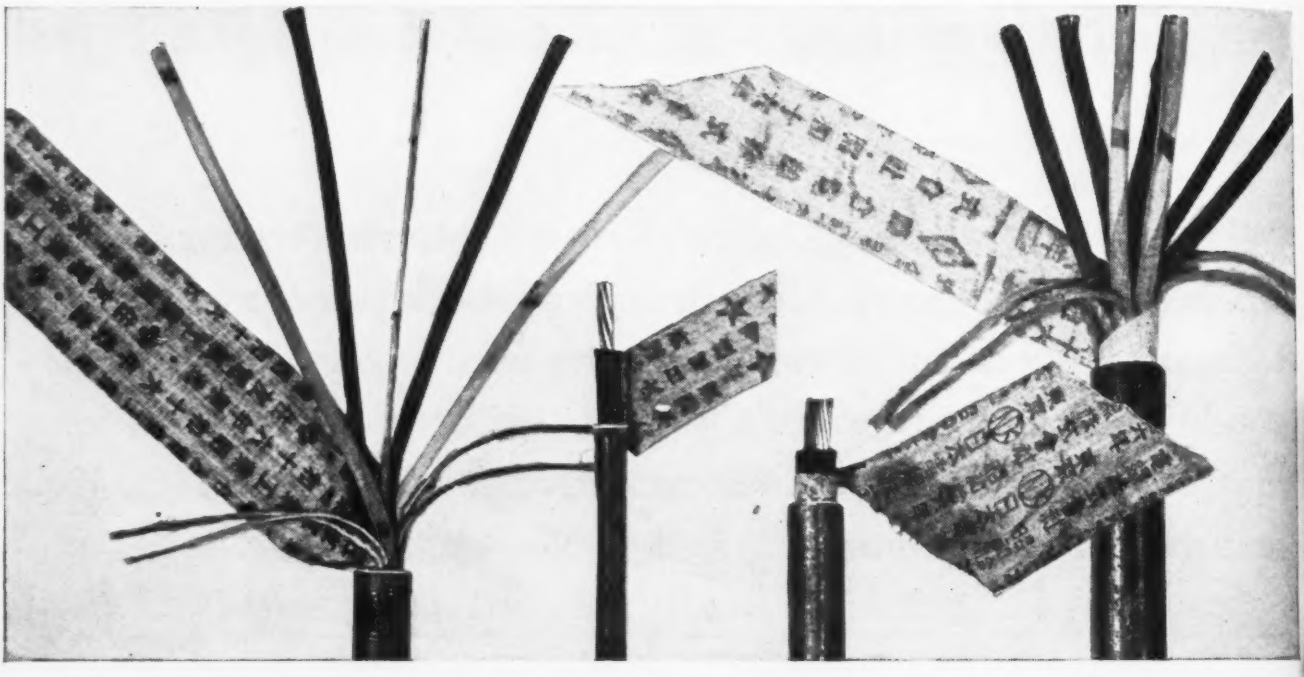
This new breaker is gaining popularity among operators for moderate capacity installations, 5 kv and below. Fire hazard is reduced, handling of oil eliminated. Contacts in the Allis-Chalmers "Ruptair" magnetic air breaker are accessible for inspection and maintenance without disturbing the arc chute.

♪ *Tune in the Boston Symphony, Blue Network, every Sat. Eve.*

MFG. CO. MILWAUKEE 1, WISCONSIN

A 1821

Found:-On the Road to Tokyo. ...Insulated Wires and Cables



These are not Simplex cables. They are not cables you would care to buy or use. They were picked up by one of our own men on the "road to Tokyo" and probably were "Made in Japan." They are of interest solely because they are enemy cables used by the Japanese while they occupied the Solomon Islands.

The cables in which we are more interested are the ones that you will need to carry out your postwar plans. Specially designed cables will be your best buy wherever you have unusual installation hazards or operating conditions. In writing specifications for such cables our long experience can be of help to you.

If you are looking for economical, efficient cable performance for communication, remote control or power transmission, you can get it with a Simplex cable engineered to fit your job.

Simplex Wire & Cable Co., 79 Sidney Street, Cambridge 39, Mass.

ARMY (E) NAVY

M★★★

Simplex

WIRES and CABLES

CHECK the FACTS

1. July testing for January service. Any condition can be duplicated—fog freezing, rain or sleet freezing, or soaking wet and quick freezing — at the freezing point or well below.

2. Complete three-pole switch with operating mechanism has been tested, first open and then closed, and the operating effort is known for any condition.

3. These ice-testing facilities helped find the answer to many switchgear problems before present War production limited this activity and will be available again when total peace time production again prevails.

A three-pole 69 KV. type TTR-A switch, shown here in the freeze chamber at 8° below zero, in a fine mist. Above, the same switch after it was withdrawn for operation test.

R&IE

Controlled **FREEZE TESTING**

The Check List

- CONDUCTOR SUPPORTS, CLAMPS AND FITTINGS
- DISCONNECTING SWITCHES INDOOR AND OUTDOOR
- HORN GAP SWITCHES
- INTERRUPTER SWITCHES
- CUTOUTS AND THERMO-RUPTERS
- SWITCH OPERATING MECHANISMS
- SUBSTATIONS
- OPEN OR ENCLOSED, ISOLATED PHASE HEAVY DUTY BUSES
- KIRK INTERLOCK SYSTEMS
- AUTOMATIC SECTIONALIZING EQUIPMENT
- METAL CUBICLES
- TESTING DEVICES

GARLAND-AFFOLTER ENGINEERING CORP.

SAN FRANCISCO • LOS ANGELES • PORTLAND • SEATTLE

LOOK FOR THIS STARTER

In the *RED PLASTIC* Can

IT LEADS THEM ALL

Pat. Nos. 2200443—2228210

Locks Out . . . Resets AUTOMATICALLY

1. Positively cuts out deactivated, flickering, blinking lamps.
2. When trouble is detected the starter automatically cuts off current to the ballast and lamp.
3. Gives long life to ballast because defective lamp is locked out. Prevents overheating.
4. When Lloyd AUTOMATIC locks out defective lamp—turn off the current—Remove defective lamp—Put in a new lamp.
   Allow at least one minute to make the above change of lamps. Turn on the current. The starter automatically lights the new lamp.
   NO NEED TO DO ANYTHING TO THE STARTER
5. Lloyd NEW PLASTIC CAN has higher dielectric strength, is stronger, lighter, distinctive.
6. Knurled rim on plastic can insures positive grip for insertion and removal of starter.
7. Plastic can is sealed. No projecting lugs to cause trouble.
8. The life of the AUTOMATIC starter is many times greater than that of the average lamp.
9. It saves maintenance costs and power consumption, protects and insures longer life to the ballast and lamp.
10. Tested in production and prior to shipment to insure perfect performance.

Lloyd Automatic Available in FS-40 and FS-100

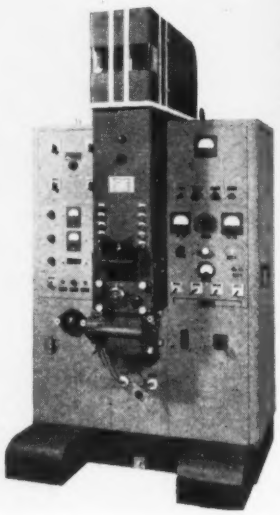
LLOYD PRODUCTS COMPANY

Dept. EW-2 Providence 5, R. I.

Representatives in 23 Leading Cities—Export Office: 13 E. 40th St., N.Y.C.

Oscillograph (204)

An electronic oscillograph said to record characteristics of electrical phenomena lasting as little as a fraction of a millionth of a second is being manufactured by Westinghouse. The instrument, which was designed for aircraft engine manufacturers, electric power companies and research laboratories, is of the cold cathode type. It is capable of recording single electrical transients with respect to time or two electrical phenomena with respect to each other, such as voltage versus current, in the form of diagrams produced by two pairs of electrostatic deflecting plates disposed at right angles to one another. The cathode of the tubes is energized from a 50-kv. d-c rectifier with a control to correct for line voltage variation. The beam is normally blocked by a target. An impulse synchronized with the phenomena will trip the relay, which bends the beam around the target so that it will strike the fluorescent screen or film below.



Wire Stripper (205)

A wire stripper for cleaning cotton and enamel, silk and enamel, string asbestos and similar types of light insulation has been announced by the Ideal Commutator Dresser Co. According to the announcement, round, flat or rectangular wire, solid or stranded, and in any length may be stripped with the device. It has two wire cleaning brushes, which are positively driven, being mounted directly on the end of separate motor shafts. The right hand motor is mounted on a pivoted base and is normally held up by a spring to keep the brushes apart, except when stripping wire, and thus increase brush life. Brushes are made in sections of special steel wire ground to size and each section is replaceable as it becomes worn. A dust collector is driven by a separate motor, has a dust capacity of 1 cu. ft. per minute and is rated at 60 cu. ft. of air per minute at a .55-in. static pressure.

Junction Boxes (206)

O. Z. Electrical Mfg. Co. has added a new line of cast iron junction boxes. The new boxes are constructed of close-grained gray iron castings of machinable quality and are said to be water and moisture proof. The line includes boxes with flanged or unflanged recessed covers for flush or surface mounting, sidewalk boxes, overlapping hinged-cover boxes, and heavy-duty junction or pulling boxes. Other boxes will be built to specification, according to the manufacturer.

QUESTIONS AND ANSWERS ON

CAPACITORS

HOW WOULD YOU RATE ON QUESTION "B"?

A: QUESTION: What is the purpose of a capacitor installation?

ANSWER: To secure the benefits of improved power factor.

B: QUESTION: How is p.f. improved by the use of capacitors?

ANSWER: A capacitor placed in the line introduces a capacitive reactance which compensates partially or wholly for the inductive reactance in the circuit.

C: QUESTION: What are some of the operating advantages improved p.f.?

ANSWER: Improved starting characteristics, reduced voltage drop, a cooler system unburdened by wattless current and increased capacity for new machinery loads.

D: QUESTION: And the financial advantages?

ANSWER: Eliminates the need for re-wiring or adding more generating and station equipment. Saves penalty charges for low p.f. and excessive demand charges. Lowered operating current means cooler supply equipment and longer life. Avoids recurring shutdowns and idle man-hours due to blown fuses because of overloaded systems.

E: QUESTION: Can some lagging loads be corrected without resorting to capacitors?

ANSWER: Frequently. An underloaded induction motor, for example, will cause a marked lowering of power factor. Substitution of a smaller-sized motor of the proper rating usually corrects this condition.

F: QUESTION: What part of a system does the capacitor affect?

ANSWER: Only that part of the system between the installation and the power source. A capacitor installed at a motor would not change the power-factor of the motor—wattless current would still flow between it and the motor—but the rest of the system would not be burdened by unproductive current.

G: QUESTION: Are capacitors expensive?

ANSWER: Far from it. Power factor improvement via capacitors is the cheapest form of correction. Average costs installed are from $6.15 per kva to $13.00.

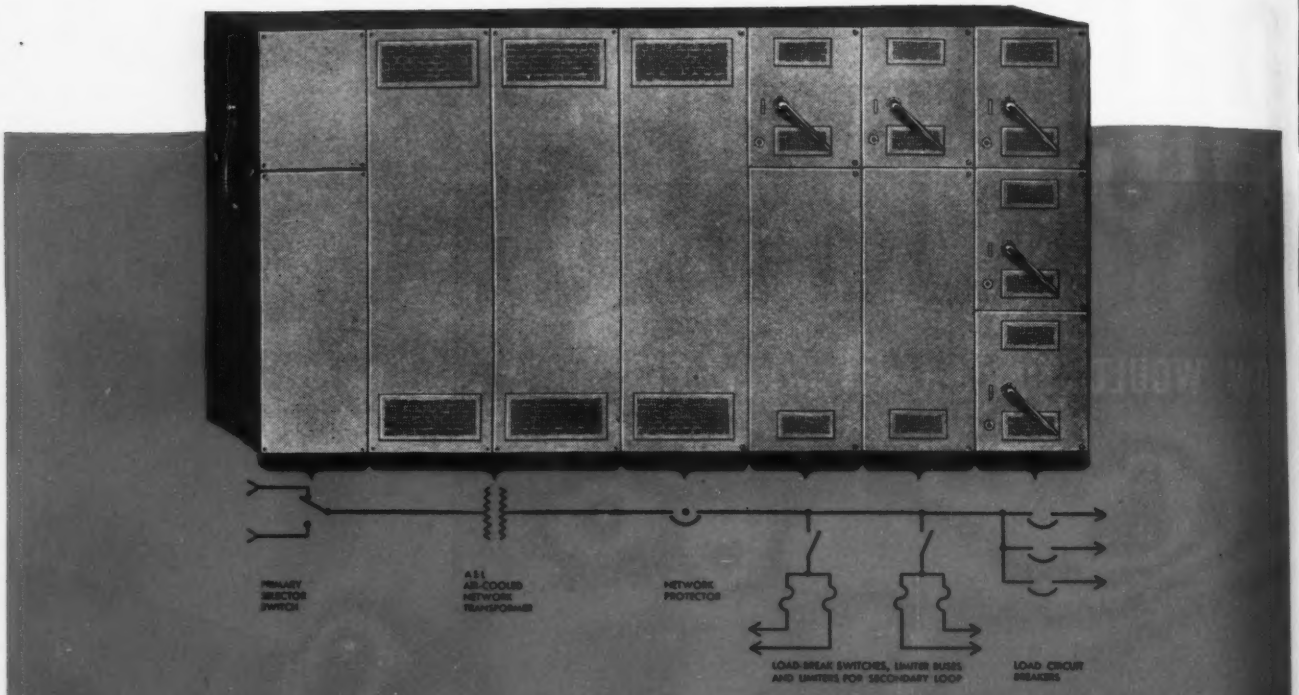
H: QUESTION: Where can I get more information on the use of capacitors?

ANSWER: Just drop us a line. Our engineers are always glad to be of assistance. Cornell-Dubilier Electric Corporation, South Plainfield, New Jersey.

WORLD'S LARGEST MANUFACTURER OF CAPACITORS

Cornell Dubilier

capacitors


PRIMARY SELECTOR SWITCH
A.S.L. AIR-COOLED NETWORK TRANSFORMER
NETWORK PROTECTOR
LOAD-BREAK SWITCHES, LIMITER BUSES AND LIMITERS FOR SECONDARY LOOP
LOAD CIRCUIT BREAKERS

A NEW HEART FOR POWER DISTRIBUTION SYSTEMS

ordered—installed—operated as a unit

Here is a new heart for power distribution systems —the *Westinghouse Network Unit.* It saves time in ordering, installation and operation. It eliminates piecemeal assembly on the job! It can be installed anywhere indoors without a vault—because it is completely air-cooled. It can be installed in the immediate vicinity of working personnel with complete safety, or it can be placed overhead to save valuable floor space.

This flexibility results in substantial savings in materials and labor, and in service interruptions, with consequent production losses. It permits location of the Network Unit at or near the centers of load.

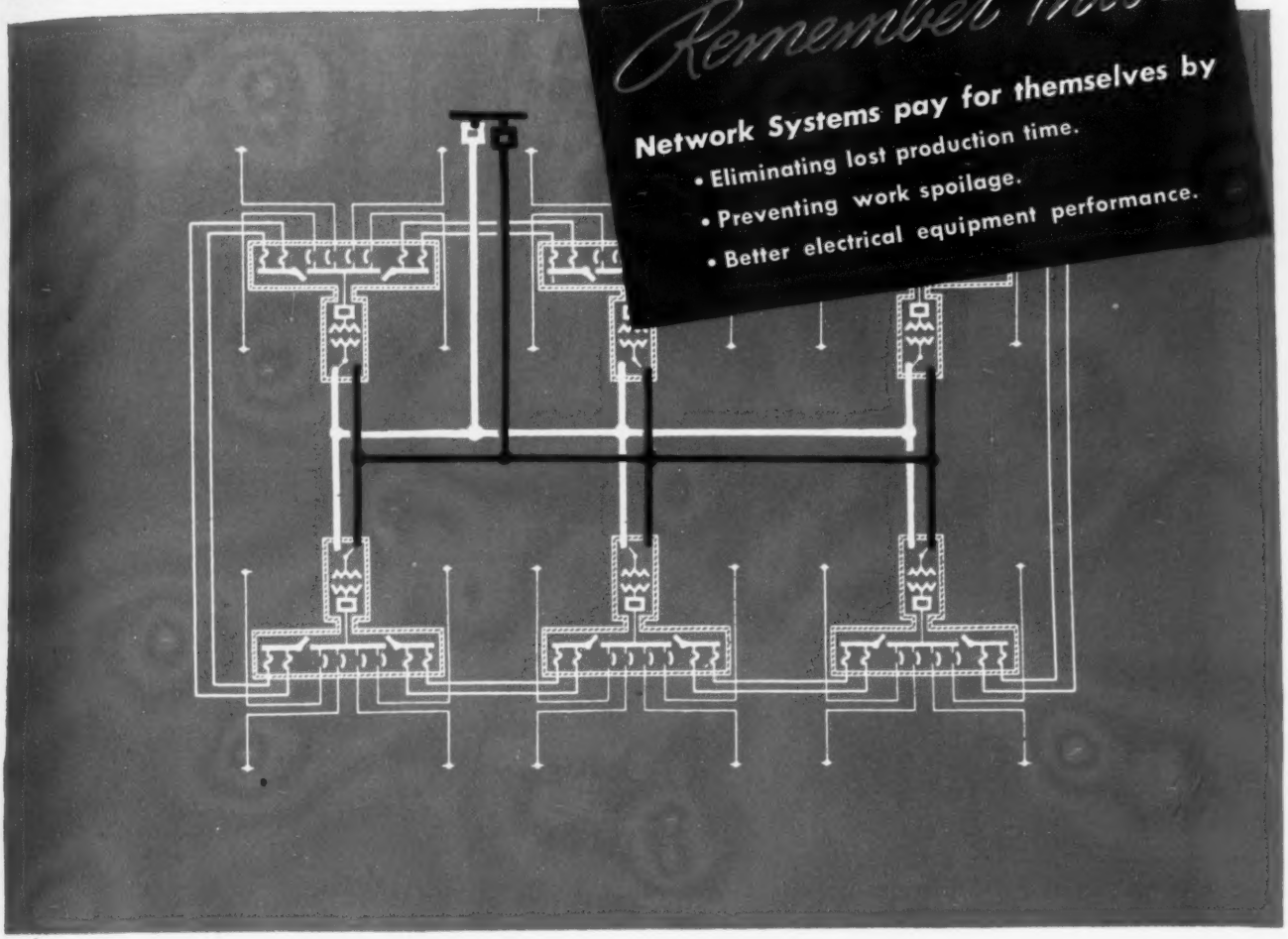
The Westinghouse Air-cooled Network Unit is only one item of the complete equipment Westinghouse can supply. Others are: control centers, power centers, switches, breakers, capacitors, protective devices, switchgear—in fact, all the equipment needed for any power distribution system. By ordering from *one* supplier, you place responsibility in *one* place . . . save time in ordering, installation and co-ordination for operation.

Complete specifications on all equipment are available to help you PLAN NOW for postwar construction. Phone your Westinghouse Office, or write Westinghouse Electric & Mfg. Co., P. O. Box 868, Pittsburgh 30, Pennsylvania. J-94642A

Westinghouse
PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

INDUSTRIAL

FOR YOUR NEW ELECTRICAL DISTRIBUTION SYSTEM


Remember this—
Network Systems pay for themselves by
• Eliminating lost production time.
• Preventing work spoilage.
• Better electrical equipment performance.

Since the first installation of Westinghouse industrial plant network systems (four years ago), we have been receiving comments like these:

- "because it assures uninterrupted service, we figure our network system has completely paid for itself by eliminating loss of production time caused by electric power interruptions."
- "light flicker has been entirely eliminated . . . improving working conditions and efficiency."
- "production has been increased because our motors are now getting the *right* voltage at *all* times . . . no longer any motor burnouts caused by undervoltage."
- "addition of new electrical facilities for critical work production was made in 50% less time . . . without disturbing any of the previous facilities."

We sincerely believe that wherever the highest degree of flexibility —reliability—and voltage regulation are "musts", the Westinghouse network system is best suited for tomorrow's profitable production of peacetime goods.

However, Westinghouse supplies all types of electrical distribution systems, and will recommend the one best suited to your needs.

Call your Westinghouse representative today for advice and *practical* help in laying out your postwar distribution system. It pays to blueprint now for tomorrow's needs.

PLANT DISTRIBUTION SYSTEMS

1 Emergencies call for quick action.
2 Without delay, dispatcher calls truck closest to the trouble.
3 Repair crews get to the trouble quickly by the shortest route.
4 Service restored. Truck on its way to next job.
GENERAL ELECTRIC

G-E 2-way FM radio speeds repairs

Wherever and whenever power disruption threatens, maintenance must get on that job—fast.

G-E 2-way FM radio is a powerful coordinator that enables you to communicate direct with your field repair crews and enables them in turn to communicate with each other. It is an important maintenance tool that will help you through every emergency and improve your service continuity. It will give you effective communication day and night, through every kind of weather.

In serving your radio communication needs, General Electric offers you the same specialized attention that is extended to you in your power distribution and maintenance requirements. Call your General Electric sales engineer when you discuss your communication problems. He will have a specialist assist in planning the most effective system for your particular installation. Write to *Electronics Department, General Electric, Schenectady 5, N. Y.*

Government regulations now permit new installations of 2-way FM radio for important requirements of utility companies. Let your G-E representative help prepare your applications.

Write for these booklets: "G-E FM Communication System Guide" gives you practical facts about the selection of 2-way FM radio and will assist you in estimating total installation costs. "G-E FM Communication Equipment Catalog" describes and illustrates the required units and equipment.

Hear the G-E Radio programs: *"The World Today" news, Monday through Friday, 6:45 p. m., EWT, CBS. "The G-E All-Girl Orchestra," Sunday 10 p. m., EWT, NBC. "The G-E House Party," Monday through Friday, 4 p. m., EWT, CBS.*

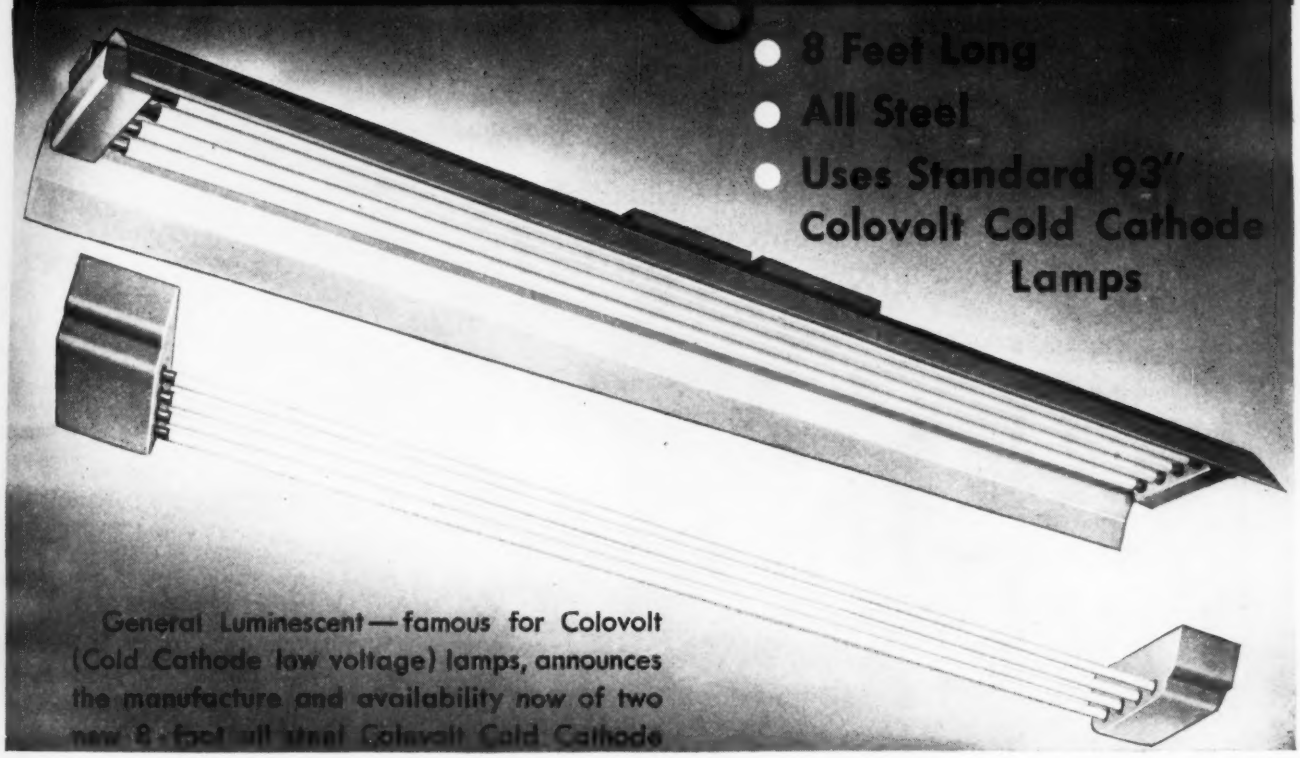
Everything for 2-way radio communication

GENERAL ELECTRIC

163-D4-6918

Now! *COLOVOLT

COLD CATHODE FIXTURES



- 8 Feet Long
- All Steel
- Uses Standard 93" Colovolt Cold Cathode Lamps

General Luminescent—famous for Colovolt (Cold Cathode low voltage) lamps, announces the manufacture and availability now of two new 8-foot all steel Colovolt Cold Cathode lighting fixtures for commercial and industrial applications in a standard "packaged" unit.

Both of these fixtures use standard 93" Colovolt 10,000 hour lamps and can be used singly or in continuous line lighting in multiples of 8 feet. Instantaneous starting, no flickering, guaranteed for 1 year except for failure due to breakage, and the fact that the long life expectancy of Colovolt lamps may be realized even when constantly turned on and off, are additional advantages.

Contact your electrical wholesaler or jobber or write us for full details.

Above

INDUSTRIAL UNIT—The Industrial Fixture, designed to give the maximum of lighting efficiency has an all-steel 8-foot baked white enamel reflector which is easily removed for cleaning. Four lamp fixture delivers 8800 lumens. Also available in a two-lamp fixture.

Below

SIMPLICITY UNIT—The "Simplicity" Lighting Unit for commercial uses is distinctive in design, easy to install and simple to maintain. This 4-lamp fixture delivers 8800 lumens.

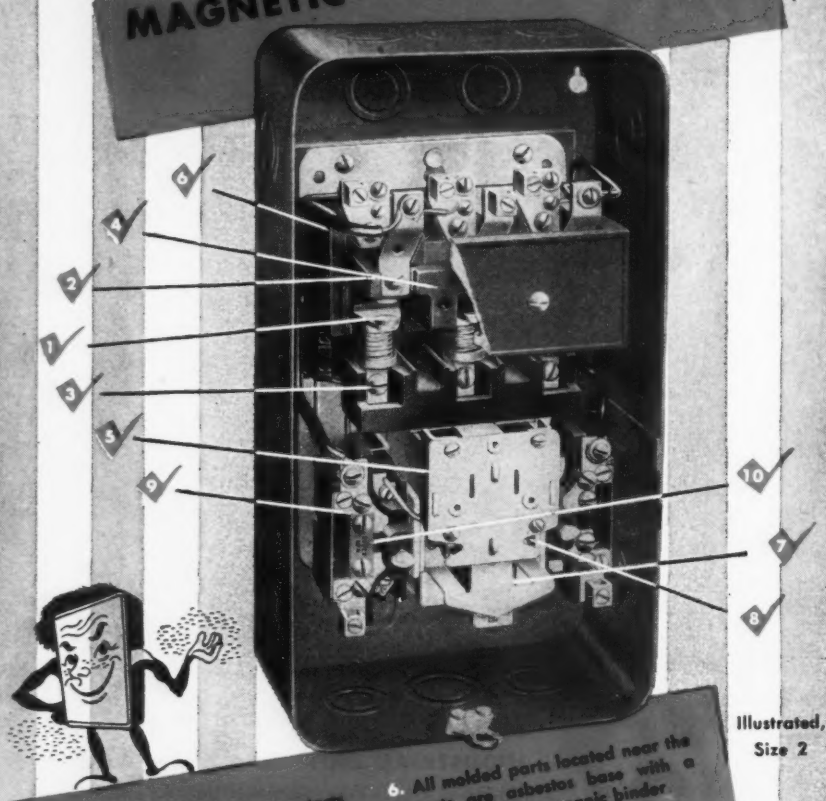
* Trade Mark registered U. S. Pat. Off.

General LUMINESCENT CORPORATION

GENERAL LUMINESCENT CORPORATION

670 SOUTH FEDERAL STREET • CHICAGO 5, ILLINOIS

HERE'S THE INSIDE STORY OF THE
Federal
NOARK
MAGNETIC MOTOR STARTER



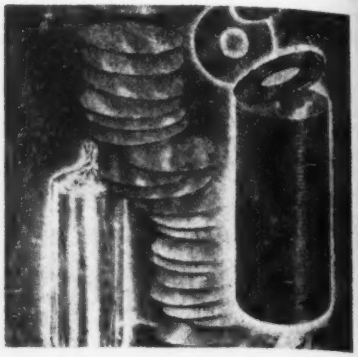
Illustrated, Size 2

1. Double break pure silver contacts.
2. Stationary contacts are held by one screw, easily accessible from the front.
3. Movable contacts are held by a single screw.
4. Heavy arc barriers are strategically located to secure mechanical strength, resist flashover, and provide high arc rupturing ability.
5. Ball bearings and movable yoke are retained under a screwed-on top plate. All parts are replaceable.
6. All molded parts located near the contacts are asbestos base with a non-carbonizing inorganic binder.
7. Straight line vertical ball bearing action.
8. The coils are readily changeable, even in the cabinet. Pull out the retainer spring, loosen yoke and take out the magnet, and the coil is free.
9. Overload Relays — Combination hand and automatic reset. Bimetallic type.
10. Heaters—Front mounted—accessible—trip ampere stamped on units.

SEND FOR NEW FEDERAL MOTOR CONTROL CATALOG 144 TODAY!

FEDERAL ELECTRIC PRODUCTS COMPANY, INC.
EXECUTIVE OFFICES, 50 PARIS ST., NEWARK 5, N. J. • PLANTS: Hartford, Conn., Newark, N. J.
Manufacturers of Motor Controls, Safety Switches, Circuit Breakers, Service Equipment, Panelboards

Carbon Rheostats (207)



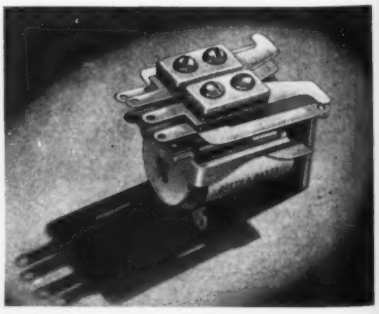
Stackpole Carbon Co. has developed new types and sizes of adjustable carbon rheostats formed of carbon disk piles, and announces that they are available in practically any length and diameter. According to the announcement, resistance is varied by changing the pressure applied to the pile. Pressure may be applied electrically, mechanically, centrifugally or hydraulically, it is stated. Typically, a carbon disc pile 1½ in. long composed of discs .432 in. in diameter permits a resistance range of from 60 ohms with 1 oz. pressure to .3 ohms at 32 lb. pressure.

Relay (208)

Struthers-Dunn has redesigned its Type 79XAX relay for simplification. It has a snap action design; parts are readily accessible and sensitivity adjustments may be made easily and quickly, according to the announcement. The standard adjustment using 60 amp. turns in the coil at approximately .02 watt results in contact pressures of 5 grams with contacts rated 5 amp., 115 volts a-c, or 0.5 amp., 115 volts d-c, noninductive. Contact ratings up to 10 amp., 115 volts a-c may be secured with 100 or more ampere turns and a corresponding increase in power. A sensitivity of 0.005 watts with 30 amp. turns is obtainable with reduced contact pressures and ratings and at an increased price.

Midget Relay (209)

Betts & Betts is making a midget type relay, especially designed for communication, electronics and aviation applications. This relay is 1 7/16 in. long, 1 in. wide and 1 1/16 in. high, including first two pairs of contacts. Each additional two pairs of contacts add ⅛ in. Weight is 1¾ oz. Coils are protected against moisture, corrosion and

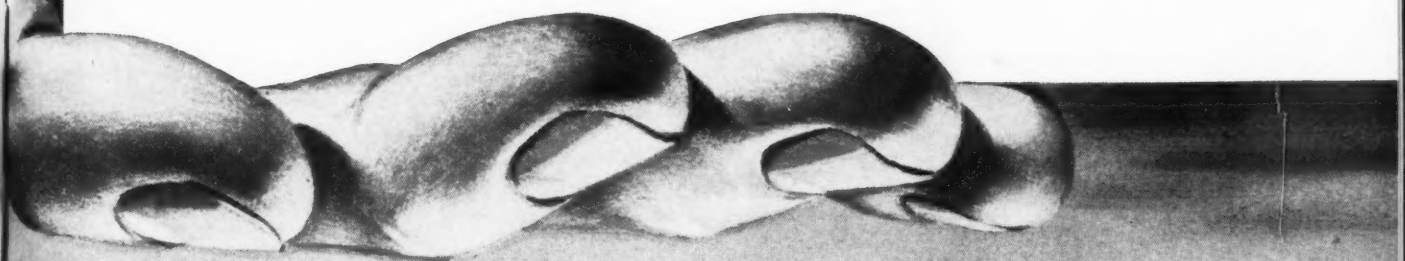


electrolytic action and have voltage range from 1½ to 70 volts d-c. According to the announcement, any arrangement of contacts can be supplied for making, breaking or both up to 12 contacts. Contact capacity is 2 amp. at 100 watts.

Another Great Leader in a Great Line... FWD's Model SU

Famous 5-Tonner Tops

$75,000,000.00 ENDORSEMENT



When a single model of a heavy duty truck is purchased in volume reaching a total dollar value of $75,000,000.00 in less than four years time, it rightfully gains leadership in its field. FWD's Model SU has won an extraordinary recognition—the endorsement of motor truck buyers exemplified in $75,000,000.00 worth of trucks bought and used since 1940.

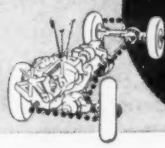
It is significant, too, that in a comparatively brief period of years this single model FWD has a background of $75,000,000.00 in manufacturing experience as well. In every sense it is a great leader in a great line of trucks.

The FWD model SU represents the most advanced development of the four-wheel-drive principle originally pioneered and sponsored by FWD since 1910. It is eminently qualified in every element of design and construction to render service of a character and extent far beyond that of any other truck.

More than ever before essential industries and motor transport organizations rely on Four-Wheel-Drive hauling power to do more work—cover more miles—at lower cost for gas—oil—tires—replacements.

When your need is dependable all-season, all-weather hauling power—look to FWD's—a great line of trucks.

THE FOUR WHEEL DRIVE AUTO CO.
Clintonville, Wisconsin
Canadian Factory: KITCHENER, ONT.



FWD TRUCKS

EST AND ORIGINAL EXCLUSIVE BUILDERS OF FOUR-WHEEL-DRIVE TRUCKS

FWD Distributors

ARIZONA—Arizona-Cedar Rapids Co., 401 N. 1st St., Phoenix, Ariz.; CALIFORNIA—Hillman-Kelley Company, 1000 Macey St., Los Angeles and FWD Pacific Co., 469 Bryant St., San Francisco 7, Calif.; COLORADO—Liberty Trucks & Parts Co., P.O. Box 1889, Denver 1, Colo.; IDAHO—Intermountain Equipment Company, Broadway at Myrtle St., Boise, Idaho; MONTANA—Steffeck Equipment Co., 11 E. Cutler St., Helena, Mont.; NEVADA—Allied Equipment Co., Reno, Nevada; NEW MEXICO—The Myers Company, Las Cruces, N.M.; OKLAHOMA—Halliburton Oil Well Cementing Co., P.O. Drawer 471, Duncan, Okla. and Oklahoma Road Mch. Co., Muskogee, Okla.; OREGON—Feenaughty Machinery Co., 112 S.E. Belmont St., Portland 14, Ore.; UTAH—Cate Equipment Co., 49 E. 9th So., Salt Lake City, Utah; WASHINGTON—Feenaughty Machinery Co., 1028 8th Ave., So., Seattle 2, Wash. and Feenaughty Machinery Co., 715 N. Division St., Spokane, Wash.; WYOMING—Wortham Machinery Co., 517 W. 17th Street, Cheyenne, Wyo.

Simplify TEST PROCEDURE

with these versatile WESTON Test Instruments

The Multi-Purpose, Super-Sensitive Analyzer

(MODEL 772)

A compact and practical wide-purpose instrument with sensitivity of 20,000 ohms per volt, or 1000 ohms per volt, on dc ranges.

Ranges – all self-contained

Voltage, a-c and d-c – 0-1000/250/50/10/2.5.

Current, d-c – 0-10/1 amps. – 0-250/50/10/1 milliamps. and 100 microamps.

Ohms – Full Scale – 30/3 megohms – 30,000/3000 ohms. Center Scale – 250,000/25,000/250/25 ohms.

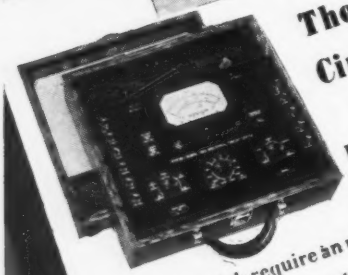
Decibels – −14 to +2; −2 to +14, +12 to +28, +26 to +42, +38 to +54.

(Voltages up to 5000 dc available through use of external WESTON Televerter, Model 766.)

The Direct-Reading, Self-Contained INSULATION TESTER

(MODEL 796)

This compact direct-reading resistance tester eliminates hand cranking and thus makes leakage testing a simple one-man job especially in unaccessable places. Tests up to 200 megohms at test potential of 350 to 500 volts d-c; although, the current at terminals is only a few microamperes. Operates from long life, light-weight batteries. There are no vibrators to replace. Ranges: 0-20-300 megohms full scale; 0-.5-5 megohms center scale. Size 8″ x 9⅛″ x 8″.



The Industrial Circuit Tester

(MODEL 785)

Recognized as the most complete unit for routine maintenance tests, and for testing needs which require an ultra-sensitive instrument.

Ranges all self-contained

D-C VOLTAGE . . . Six Full Scale Ranges of: 1/10/50/200/500/1000 volts (20,000 Ohms per volt).

A-C VOLTAGE . . . Six Full Scale Ranges of: 5/15/30/150/300/750 (1,000 Ohms per volt).

D-C CURRENT . . . Six Full Scale Ranges of: 50 Microamps . . . 1/10/100 Milliamps. . . . 1/10 Amps. (Higher ranges, at half scale reading, with 100 mv. external shunts).

A-C CURRENT . . . Four Full Scale Ranges of: .5 1/5/10 Amperes. (Higher Ranges with external current Transformers.)

RESISTANCE . . . Five Full Scale Ranges of: 3,000/30,000/300,000 Ohms . . . 3/30 Megohms. Center Scale Values . . . 25/250/2,500/25,000/250,000 Ohms. (Self-Contained Batteries)

With production currently running slightly ahead of war requirements, a limited number of the popular WESTON test instruments shown herewith are available and are offered subject to prior sale. Orders can be placed direct, or with the WESTON representative in your vicinity. Literature available from...WESTON Electrical Instrument Corporation, 577 Frelinghuysen Avenue, Newark 5, New Jersey.

WESTON
INSTRUMENTS

CONDULETS

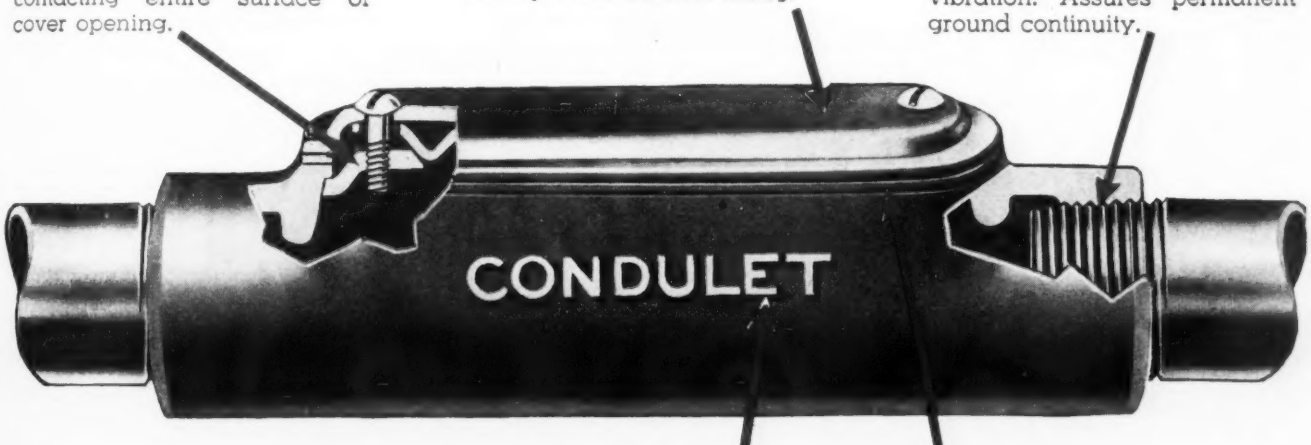
are made only by CROUSE-HINDS

The Crouse-Hinds Company introduced the first cast electrical conduit fitting that was ever manufactured. Identified by the Crouse-Hinds trade name, **CONDULET,** this fitting was so well designed that it quickly revolutionized electrical conduit installation practice. Today, the complete CONDULET line, greatly expanded and improved, is still the Standard of Quality in the field of electrical conduit fittings.

The WEDGENUT fastener, an exclusive Crouse-Hinds feature, is part of the cover. Screws can't fall out. No screw holes to locate. When tightened by the WEDGENUT fastener, the cover automatically seats itself, firmly contacting entire surface of cover opening.

The Obround CONDULET was the original cast electrical conduit fitting. Today's improved CONDULETS have quality features not found in any other conduit fitting.

Taper Tapped Threads, an important Crouse-Hinds feature. The threads on tapered conduit bear against every thread in the hub of a taper tapped CONDULET. This provides the most rigid joint, not affected by vibration. Assures permanent ground continuity.



CONDULETS are made only by Crouse-Hinds and every genuine CONDULET bears the Crouse-Hinds trade name, **CONDULET,** or the Crouse-Hinds trade-mark.

When a gasket is used, you have a thoroughly **Weatherproof** enclosure.

Obround CONDULETS are a large and useful Series in the big CONDULET family. There are **49** different Obround Types listed in CONDULET Catalog No. 2500, Section 5. Sizes to fit ⅛" to 6" conduit. Three styles of hubs: for thick wall threaded conduit; for thick wall threadless conduit; for thin wall threadless conduit (electrical metallic tubing). In addition to plain covers, a variety of wire hole, switch, and receptacle covers are available.

A Nationwide Distribution Through Electrical Wholesalers

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CROUSE-HINDS COMPANY
SYRACUSE 1, N. Y., U.S.A.

Offices: Birmingham—Boston—Chicago—Cincinnati—Cleveland—Dallas—Denver—Detroit—Houston—Indianapolis—Kansas City—Los Angeles—Milwaukee—Minneapolis New York—Philadelphia—Pittsburgh—San Francisco—Seattle—St. Louis—Washington. *Resident Product Engineers:* Albany—Atlanta—Charlotte—New Orleans

CROUSE-HINDS COMPANY OF CANADA, LTD., *Main Office and Plant:* TORONTO, ONT.

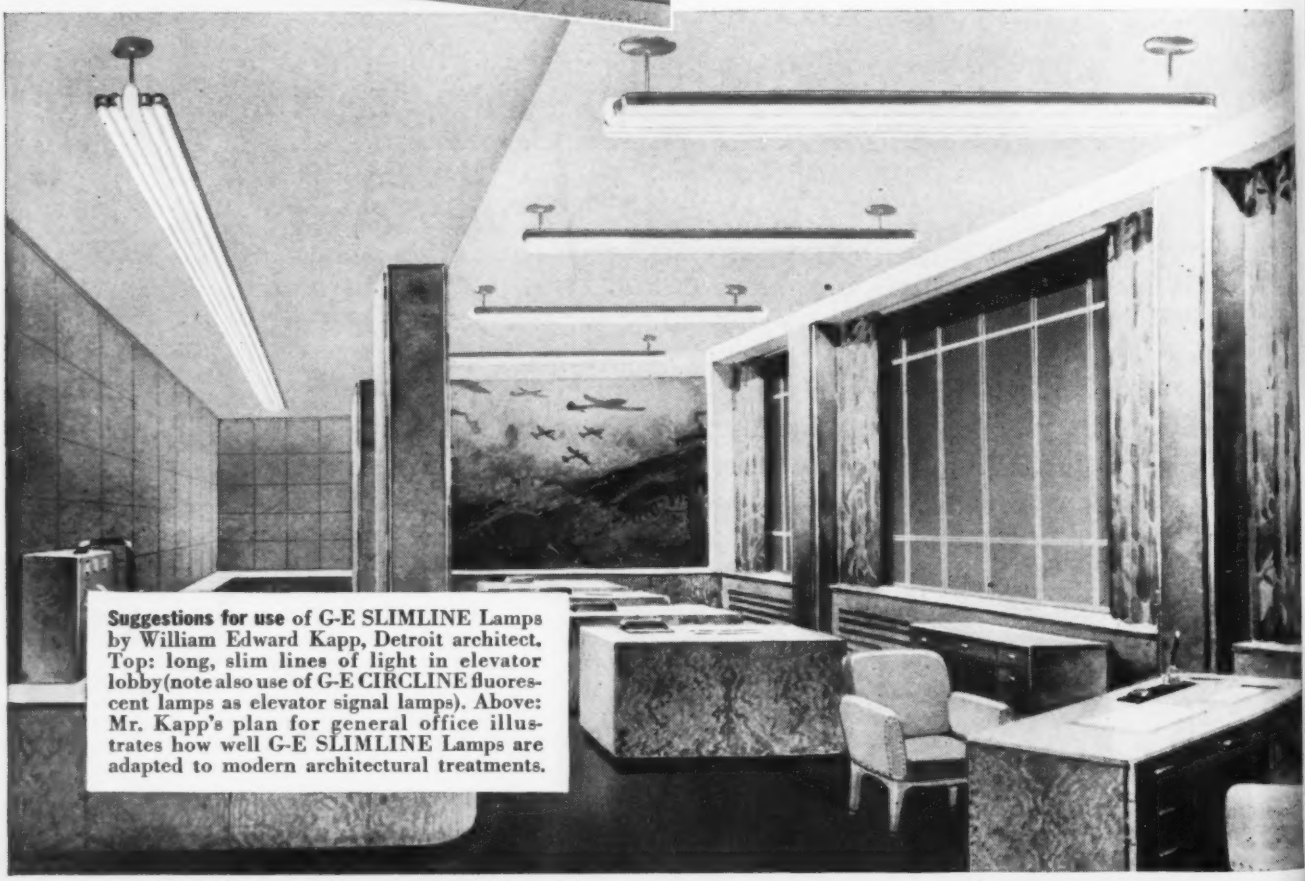
CONDULETS · TRAFFIC SIGNALS · AIRPORT LIGHTING · FLOODLIGHTS

TWO NEW NAMES

1 G-E SLIMLINE fluorescent lamps

Several months ago, General Electric announced the G-E SLIMLINE—four new fluorescent lamps with unique new design and operating advantages. These slimmer fluorescent lamps, up to eight feet in length, promise a wealth of new lighting opportunities, especially in the commercial field.

G-E SLIMLINE lamps will be available in two diameters: three-quarters of an inch (42″ and 64″ long) and one inch (72″ and 96″ long). Other outstanding features: (1) instant starting, (2) long life, (3) higher efficiency—average of 60 lumens per watt, (4) operation singly, in multiple or in series and (5) operation over a range of current values from 100 to 200 milliamperes. Quantity production of G-E SLIMLINE Mazda Fluorescent Lamps will proceed as soon as conditions permit.



Suggestions for use of G-E SLIMLINE Lamps by William Edward Kapp, Detroit architect. Top: long, slim lines of light in elevator lobby (note also use of G-E CIRCLINE fluorescent lamps as elevator signal lamps). Above: Mr. Kapp's plan for general office illustrates how well G-E SLIMLINE Lamps are adapted to modern architectural treatments.

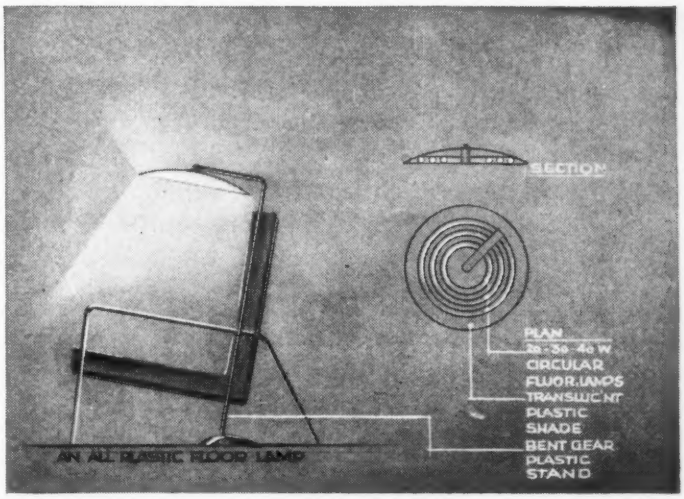
TO REMEMBER:

2 G-E CIRCLINE fluorescent lamps

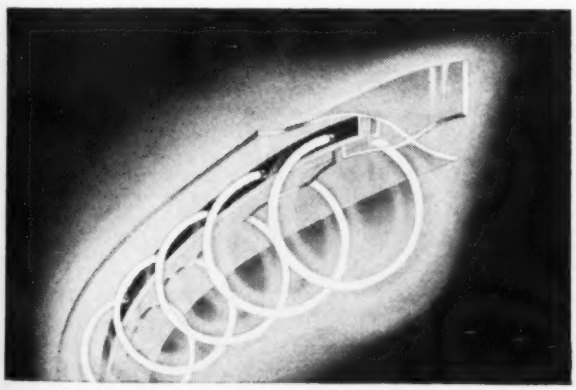
Architects commissioned by G-E to suggest creative ideas for postwar lighting, have been quick to take advantage of the dramatic new design opportunities afforded by G-E CIRCLINE Fluorescent Lamps. Examples are the illustrations on this page.

Present plans call for three circular lamps with approximate outside diameters of 8½, 12¼ and 16 inches. Bulb diameters are expected to range up to 1¼ or 1½ inches, and approximate watts from 15 to 50.

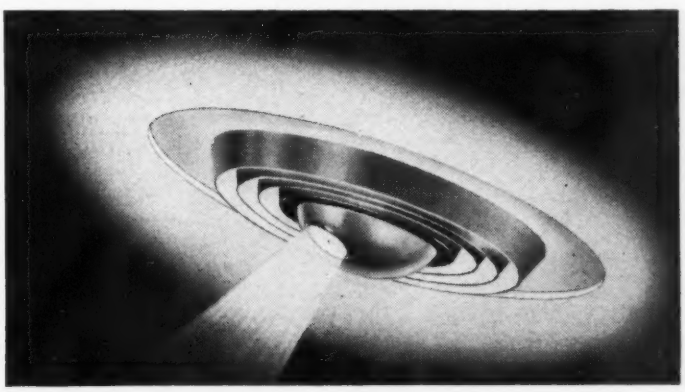
In addition to their use in commercial lighting applications, circular fluorescent lamps probably will find a place in portable and ceiling lamps for the home, either alone or in combination with filament lamps. Final design and production of G-E CIRCLINE Fluorescent Lamps will proceed when conditions permit.



Nest of three G-E CIRCLINE Fluorescent Lamps is used in this floor lamp. Shallow plastic shade gives maximum light. Design suggested by N. A. Owings, of Skidmore, Owings and Merrill, architects, Chicago.



Wurdeman & Becket, architects, Los Angeles, envision use of G-E CIRCLINE Lamps in this fixture for stores. Rings of light at regularly spaced intervals in ceilings are designed to direct customer traffic to rear of store. The cast phenolic reflector suggested here would help direct light down on the aisle.



Another Wurdeman & Becket design for a ceiling luminaire for stores, combining G-E CIRCLINE Lamp with filament lamps and spotlamp. At center is R-40 spotlight for dramatic highlighting of merchandise. Above it, a G-E CIRCLINE lamp illuminates bowl. Two 100-watt filament lamps, one on each side of center bowl, furnish general illumination.

BUY WAR BONDS AND HOLD THEM

Hear the G-E radio programs: "The G-E All-Girl Orchestra", Sunday 10:00 p. m. EWT, NBC; "The World Today" news, Monday through Friday 6:45 p. m. EWT, CBS; "The G-E Houseparty," Monday through Friday 4:00 p. m. EWT, CBS.

"To make G-E Lamps STAY BRIGHTER LONGER" — The Constant Aim of G-E Lamp Research

G-E MAZDA LAMPS

GENERAL ELECTRIC

THE IWI MAN
WITH A WISE PLAN
knows that

MALLORY CAPACITORS

Can take it!

Sturdy and strong, built to give good service for a long time, Mallory Capacitors last.

MALLORY CAPACITORS

are Standardized!

So you can meet any capacitor requirements, for round or square types, with less stock on your shelves.

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are listed in the IWI Blue Catalog, to make selection and purchase easy for you. Send for a catalog today

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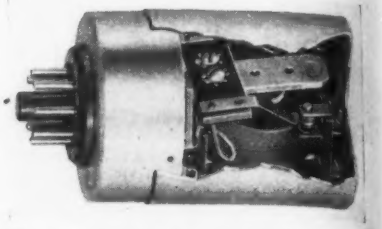
INSULATION & WIRES, INC.
2127 PINE STREET • ST. LOUIS, MO.

Plug-In Relay (210)



Ward Leonard has announced a relay of the plug-in type, enclosed in a metal can and fitted with a standard octal plug base. Operating on standard voltages up to 115 volts, a-c or d-c, this relay is a modification of the type used in small radio transmitters, aircraft control circuits and for similar applications where space is limited. Double-pole, double-throw contacts are rated 4 amp. at 115 volts, 60 cycle, a-c., and at 24 volts, d-c, ½ amp. from 25 to 115 volts, d-c.

Glow Lamp (211)

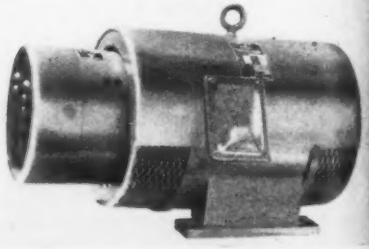
Westinghouse has developed a new type of glow lamp. This miniature fluorescent lamp is about the size of a marble and is said to put out continuously more light than a quarter-watt neon glow lamp with an energy input less than 1 kwh. for one year of continuous burning. It emits a green light, which makes it suitable as a night light in bathrooms, stairways and halls. It is not now available for civilian use; later sizes up to one watt may be made for use as markers and indicators on panels and for other industrial applications.

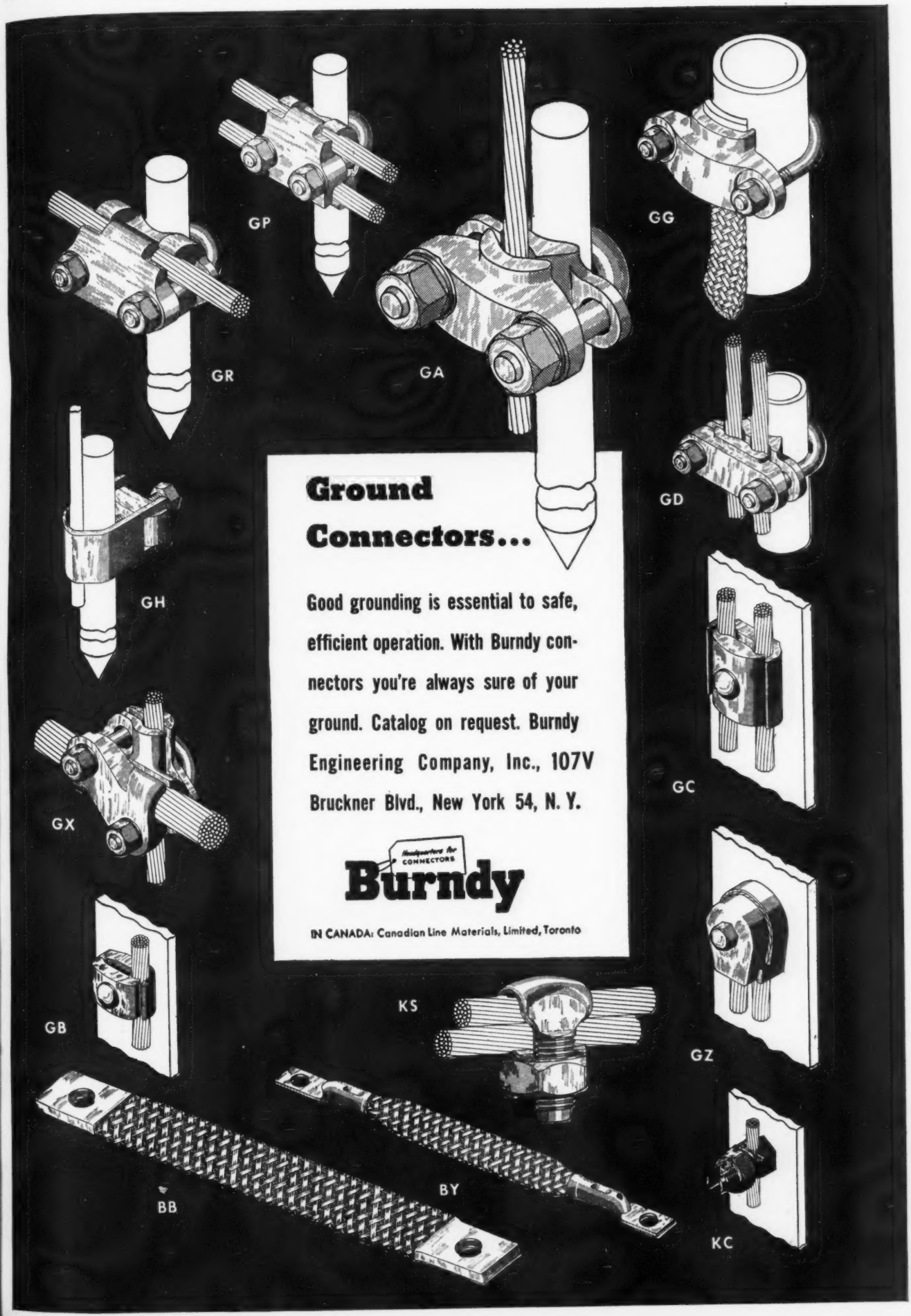
Vibration Recorder (212)

For recording vibration in remote parts of a plant, Westinghouse has designed the Vibrograph, a device about the size of an ordinary box camera and weighing less than 9 lb. The Vibrograph requires no power connection; writes a permanent record of vibrations over the range of 600 to 15,000 cycles per minutes and amplitudes as low as one-ten thousandth of an inch or as great as one sixteenth of an inch. The record and a timing wave are drawn by a stylus on a transparent plastic tape one inch wide, viewed by a low-power microscope.

Small Generators (213)

Electric Machinery Mfg. Co. has a new line of small a-c generators of the revolving field type. They are built in ratings 6.25 kva., 1,800 and 1,200 r.p.m. to 18.7 kva., 1,800 r.p.m.; single- and three-phase; standard and close regulation; 120, 120/208, 240 and 600 volts, and can be supplied as two-bearing units for belted or coupled duty or single-bearing for close coupling to driving engine. Drip proof generator and exciter construction is standard, the announcement states.

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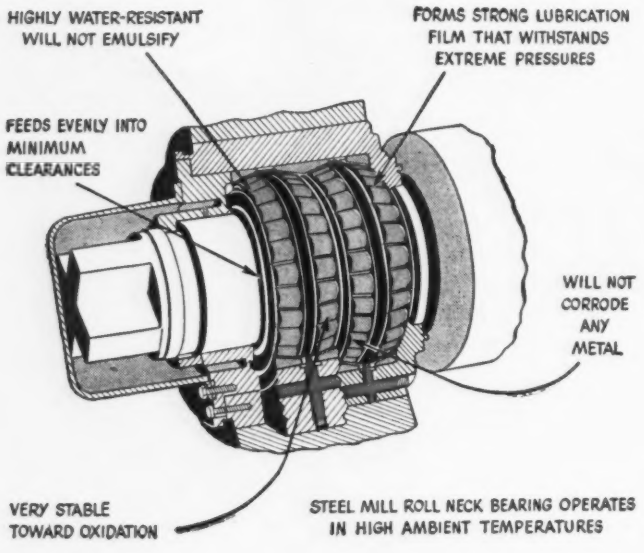
Ground Connectors...
Good grounding is essential to safe, efficient operation. With Burndy connectors you're always sure of your ground. Catalog on request. Burndy Engineering Company, Inc., 107V Bruckner Blvd., New York 54, N. Y.
Headquarters for CONNECTORS
Burndy
IN CANADA: Canadian Line Materials, Limited, Toronto

STANDARD ENGINEERS NOTEBOOK

VOL. 2-L No. 1

Lubrication of anti-friction bearings under severe conditions



Wherever heavy-duty, grease-type ball or roller bearings are subjected to high temperatures, extreme pressures or moisture, Calol E. P. Roller Grease will solve the severe lubrication problems. Calol E. P. Roller Grease is made from heavy bodied oil and special soap wherein are incorporated extreme pressure additives. It is very cohesive and stable, lubricates satisfactorily under bearing operating temperatures up to 225°F. It provides a tough lubricant film that withstands pressures far higher than other greases used on heavy-duty anti-friction bearings.

Fully moisture resistant, it resists oxidation, is non-corrosive to any bearing, and handles easily in pressure systems, even at low temperatures.

Calol E. P. Roller Grease was originally developed for steel mill operations. It is used with complete satisfaction in these mills on roll neck bearings, which carry huge loads in high temperatures.

High-grade pale engine oils have many uses in industry

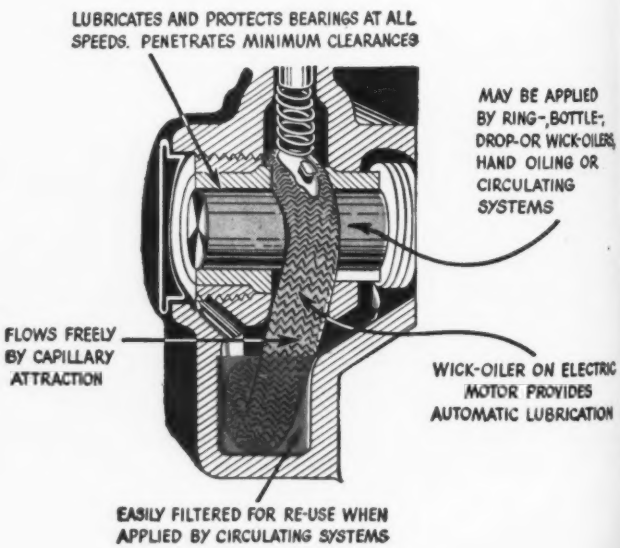
Calol Engine Oils have been used successfully for years by engineers to meet varying lubrication conditions in many different mills and factories.

These oils are solvent refined and are always uniform. They are straight mineral oils, pale in color and exceptionally stable in use.

Calol Engine Oils may be applied by all types of oilers. The heavier grades may be used in circulating systems in which oil is filtered and re-used.

Their low pour points assure a controlled flow of oil to bearings and easy handling in cold weather.

Calol Engine Oils come in three grades: 5, extremely light in body, is recommended for high-speed spindles and ring-oiled electric motors in sub-zero temperatures; 8 and 10 are recommended for bearings on steam engines, generators, motors and other high grade machinery lubricated by ring-, bottle-, drop-feed-, or wick-feed oilers, or by hand. They can also be applied by circulating systems.



Standard Fuel and Lubricant Engineers are always at your service. They'll gladly give you expert help — make your maintenance job easier. Call your Standard Representative or write Standard of California, 225 Bush St., San Francisco 20, California.

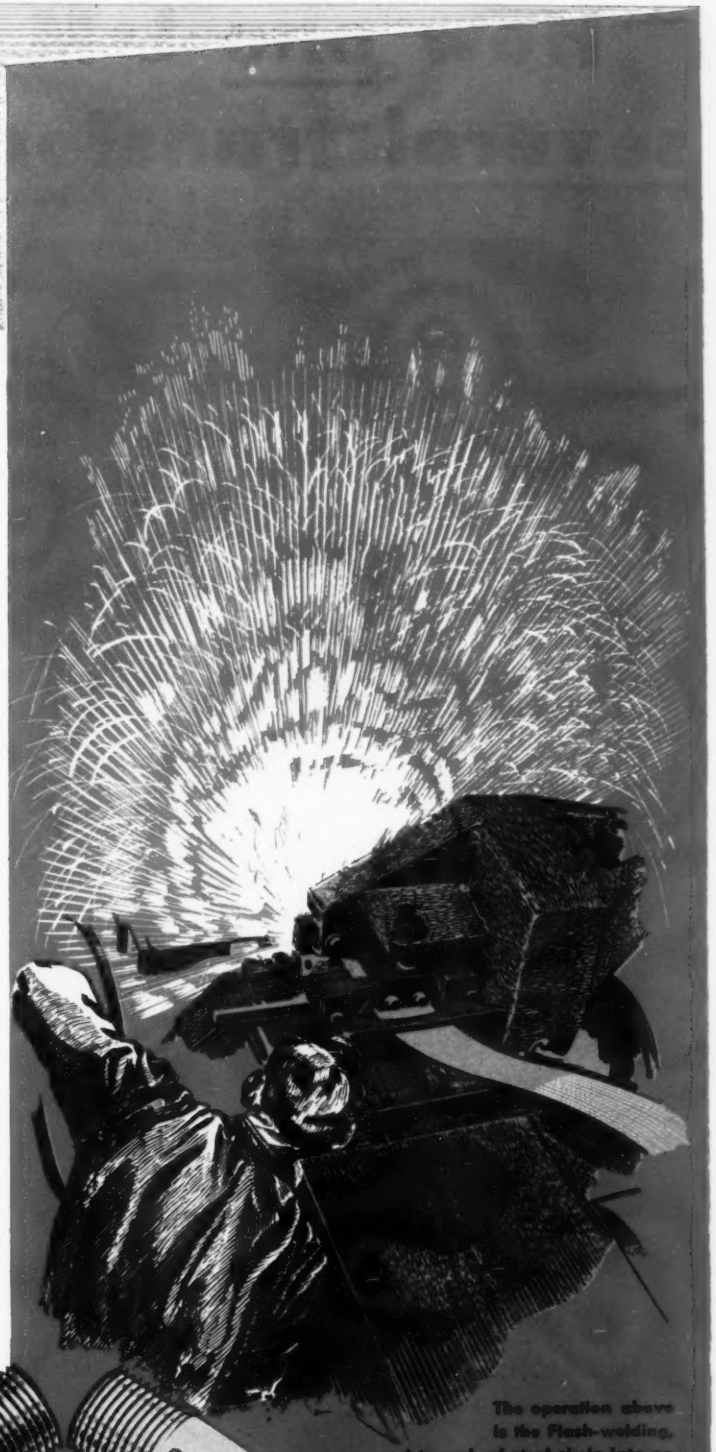
STANDARD OF CALIFORNIA

We control the quality of

CENTRAL
RIGID STEEL
CONDUIT

. . . because it is made in our own mills, from time tested Spang pipe.

"There's Tested Strength in Every Length"



The operation above is the Flash-welding, end to end, of steel skelp into an endless steel strip preparatory to heating, forming, and welding into Continuous Weld Pipe, which is further processed into finished CENTRAL Conduit.

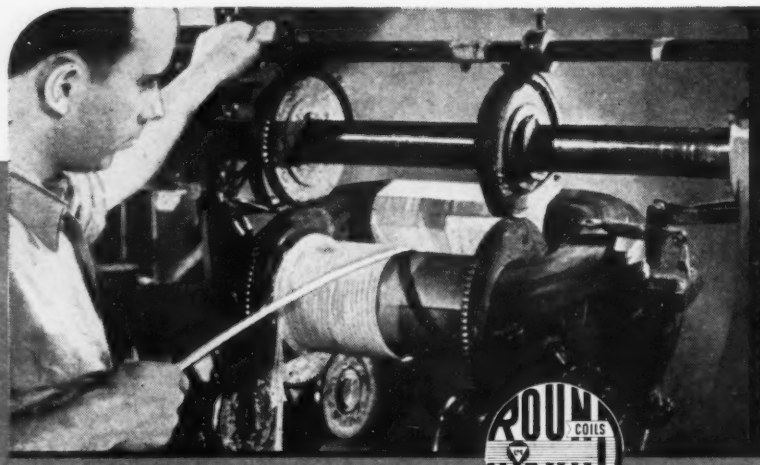
SPANG-CHALFANT

Division of The National Supply Company

General Sales Office: Grant Building, Pittsburgh 30, Pa.

District Offices and Sales Representatives in Principal Cities

How one L-M idea solved several transformer problems



ADVANTAGES OF ROUND-WOUND CONSTRUCTION

1. Improved regulation at *all* power factors
2. Better ratio of losses
3. Uniformly low exciting current
4. Uniformly high impulse strength
5. High short-time overload capacity

L-M Round-Wound transformers are available in 1½ to 25 Kva., 2400 to 7620 volt rating. Meet all EEI and NEMA standards.

ROUND COILS WOUND CORE

For years, high core loss, high exciting current, and other undesirable characteristics were considered unavoidable in distribution transformers. These were the direct result of built-up, laminated cores, with their air gaps, square corners, and right angle changes of grain and flux direction; short rectangular coils made to slip on over the rectangular core legs; and uneven cooling and hot spots. These factors were part of the only practical construction method then known.

Spurred by competition, designers strove to improve their methods—to secure the recognition of increased sales that a better product wins; and to render a service to their customers and the industry.

In this contest for product improvement, Line Material was in a fortunate position. It did not need to diversify its research over a long line of products. Yet, being much larger than smaller specialist companies, it was well able to finance a long-time research program.

In fact, for many years Line Material had maintained well-equipped laboratories and a staff of research engineers, many of them with practical field experience.

The result, in brief, was the Round-Wound Transformer. With the core WOUND with the grain, in an ellipse, under tension, without air gaps, this design reduced core loss and exciting current substantially. An ingenious method of winding coils right onto the core made it possible to leave the core undisturbed after annealing; made possible the long ROUND coils, enveloping a maximum of the iron circuit.

Round-Wound construction not only solved the problem of core loss, but also gave far greater efficiency in other respects—better cooling, better regulation at *all* power factors, higher impulse strength, and greater short-time overload capacity.

For the whole story, ask the Line Material Field Engineer for a copy of illustrated Bulletin RW-421; call or write the nearest L-M branch office or Line Material Company, Milwaukee 1, Wisconsin.

LM

LINE MATERIAL

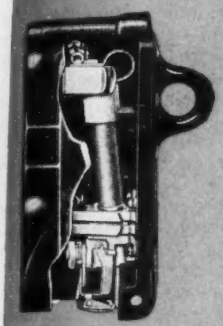
TRANSFORMERS

L-M DISTRIBUTION EQUIPMENT INCLUDES: Distribution Transformers • Fuse Cutouts and Fuse Links • Lightning Arresters Oil Switches • Pole Line Hardware • Line Construction Specialties • Underground Equipment • Fibre Conduit • Street Lighting Equipment

How they operate shows why L-M "PVD" DISCONNECTING INDICATING FUSE CUTOUTS

Give . . . instant action . . . fast re-fusing . . . long, dependable service

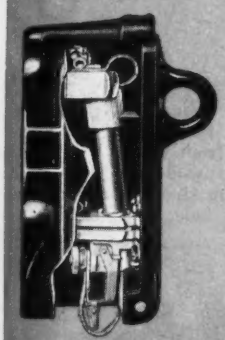
The design and construction of "PVD" Fuse Cutouts assures quality beyond and above that of the usual fuse cutout. Link flip-out device assures instant separation of blown link. Arc clears in the tube—no arcing between contacts. Operation is completely independent of door, which remains closed at all times, protecting parts from weather, dirt, corrosion; and assuring long, dependable operation. The indicating feature saves hunting and, with the fast re-fusing for which "PVD" Cutouts are noted, helps shorten interruptions of service. Get the details; ask your L-M field engineer to tell you about "PVD'S"; call or write the nearest L-M office, or Line Material Company, Milwaukee 1, Wisconsin.



Here's the "PVD" cycle of operation

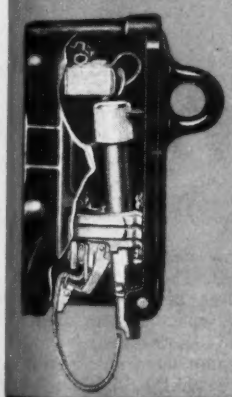
1

Fused position. Door always closed; parts always protected from weather, dirt, corrosion. *Operation is independent of the door.*



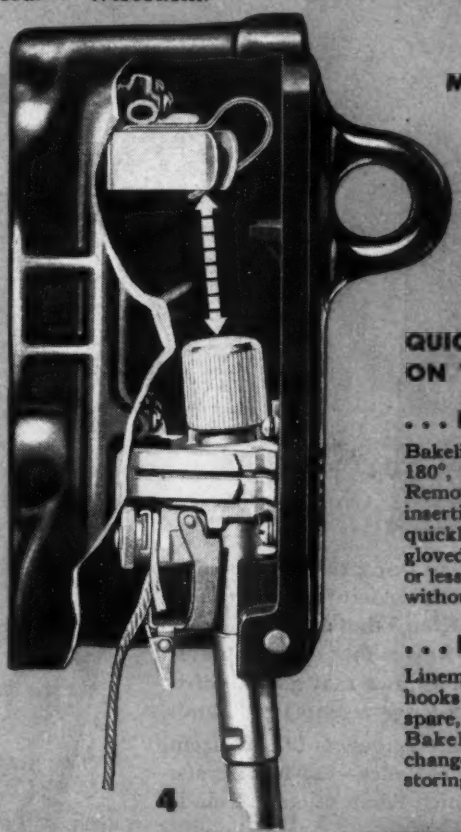
2

As fuse blows, link flip-out device assures instant separation of blown link parts before latching lever can release tube to indicating position.



3

Arc clears inside tube before contacts separate. As latching lever releases tube, upper contact follows tube part way; gives extra time to clear arc; assures positive drop.



4

Large air gap between contacts prevents arcing; assures long service. Cartridge drops to indicating position—easily seen from ground. This signal saves time, saves hunting.

MADE IN 4 SIZES

5000 V. delta, 50 amp.
7500/12500 V. Gr. Y., 50 amp.
5000 V. delta, 100 amp.
7500/12500 V. Gr. Y., 100 amp.

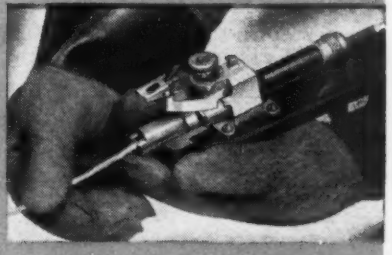
QUICKLY RE-FUSED, ON THE POLE!

. . . IN ONE MINUTE

Bakelite door swings open 180°, then unhooks easily. Removing blown link and inserting new one is done quickly, easily; even with gloved hands. In 60 seconds or less the whole job is done, without any tools.

. . . IN SIX SECONDS

Lineman just opens and unhooks door, and slams on a spare, fused "PVD" door. Bakelite doors are interchangeable, save time in restoring service.



LINE MATERIAL
FUSE CUTOUTS & FUSE LINKS

L-M DISTRIBUTION EQUIPMENT INCLUDES: Distribution Transformers • Fuse Cutouts and Fuse Links • Lightning Arresters Oil Switches • Pole Line Hardware • Line Construction Specialties • Underground Equipment • Fibre Conduit • Street Lighting Equipment

The rounded nose permits working in confined spaces—no sharp edges to nick wires
Matched jaws—serrated inside—for sure grip
Sharp knives are matched and honed to assure clean cutting
Hinge—perfect fit—jaws do not get out of alignment
Perfect balance with weight properly distributed makes Klein's easier to use
"Hand fit" handle
Spring tempering in the handle, prevents tiring hands
KLEIN TOOLS
CHICAGO, U.S.A.

WHY

Klein Pliers

STAND FIRST

Ask a lineman—electrician—or a skilled craftsman in any field why he prefers Klein pliers. He may mention the balance of Kleins that makes them feel comfortable—the sharp knives that stay keen even after years of service—the jaws that grip tight or the spring in the handles that prevents tired hands.

All of these qualities are evidences of the careful design—the years of experience—the hand-craftsmanship methods by which Klein pliers are made.

But even more they typify the careful control of every step in the manufacture—from the specification of the high grade tool steel made to our analysis to the individual inspection every pair of Klein's receives before it is boxed ready for shipment.

Obviously it costs more to produce pliers by Klein craftsmanship methods—but users of good tools recognize that the higher quality of these tools—the better service they render—the longer life they assure—are well worth the additional cost.

ASK YOUR SUPPLIER

Foreign Distributor:
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Mathias KLEIN & Sons
Established 1857 — Chicago, Ill., U.S.A.
3200 BELMONT AVENUE, CHICAGO 18, ILLINOIS

Since 1857

Frequency Relays (214)

Westinghouse has announced new frequency relays designed to aid in holding together systems with single tie lines. One of the new relays is used where a break in a tie-line might force the dumping of important load, before the two systems could be resynchronized. According to the announcement, the relay functions to decrease the amount of load dropped and to do it on a preselected basis instead of in the heat of an emergency. This unit uses a single electro-magnet and has two balanced circuits arranged so that a small change in power factor makes large changes in current, resulting in a high torque for the operating element.

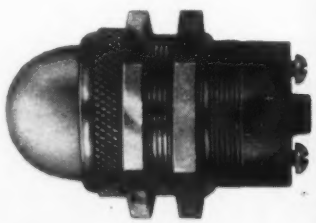
Another of the new relays is used where surplus electric power produced in a plant is fed into a local utility system, to prevent the factory generating system from trying to take the entire load, if, for any reason, the frequency on the public system drops.

A third development is an extension of the single-pole reclosing scheme, and provides for opening of two lines, if they are involved in two phase-to-ground or line-to-line faults. This leaves one line tying the system together, reducing the tendency for the two systems to swing apart in speed before reclosure.

An improvement on carrier relaying recently announced involves a relay which by comparing the waves at the ends of a line section, determines whether or not a breaker should open. Main features, according to the announcement, are that one relay is used for all three phases instead of one for each and, because no voltage discrimination is required, no potential transformers are needed.

Indicating Light (215)

A shallow-depth indicating light has been designed by the H. R. Kirkland Co. Over-all depth behind the front of the panel to the extreme end of the insulation barrier is one inch. The unit is for single-hole mounting in a 1⅜ in. diameter hole in panels up to ¼ in. thickness.

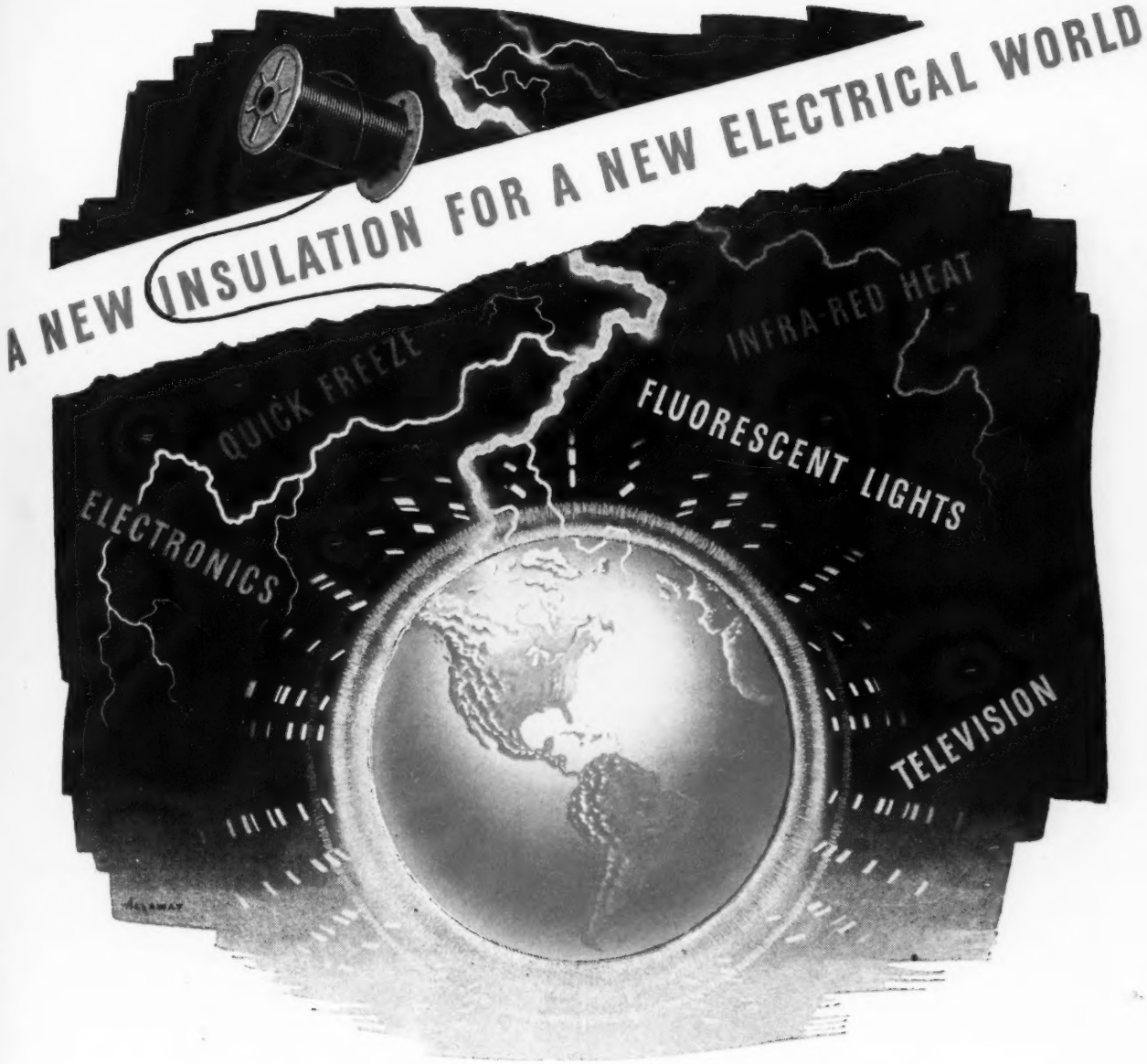


Aircraft Ammeter (216)

Westinghouse has designed a miniature ammeter for aircraft. The instrument is 1¾ in. square and seven of them will occupy 21.5 sq. in. of panel space as compared with 74 sq. in. for the 3¼-in. instrument, according to the announcement. Saving in weight is said to be 79.1%. Dial is 1.2 in. long, as compared with 1.8 in. for the 2½-in. instrument.

Safety Goggles (217)

American Optical Co. has an improved Duralite safety goggle, which, according to the announcement, conforms to the contour of the face; has eye cups shaped to fit right and left eye and which are non-conductors of heat and electricity.



nubun

Tomorrow's world will witness countless new home benefits from electricity. In the kitchen, new quick-freeze refrigerators and new infra-red, deep-heat stoves—throughout your house, new high-frequency lighting, new FM and television radios. And to deliver electricity for this, not the ordinary wire of today, ***but a new wire, with new and higher electrical standards will be required.***

Scientists have pioneered a better insulation for just such a wire. Through research that stems from the rubber molecule itself, and through precise methods of production, United States Rubber Company has developed Nubun...a new buna rubber insulation, flexible, moisture-resistant, tough—safe. Nubun is applied by the unique dipped process that permits perfect centering of the wire and a diameter smaller than any now commercially available.

Serving Through Science

Listen to "Science Looks Forward"—new series of talks by the great scientists of America—on the Philharmonic-Symphony program. CBS network, Sunday afternoon 3:00 to 4:30 E.W.T.

UNITED STATES RUBBER COMPANY

1230 Sixth Avenue, Rockefeller Center, New York 20, N. Y. · *In Canada:* Dominion Rubber Co., Ltd.

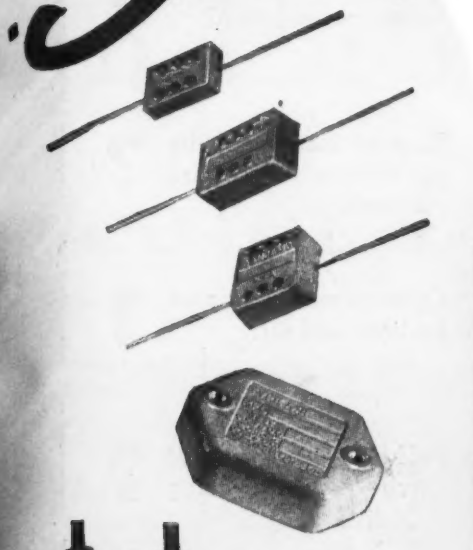
HOW EXCELLENCE IS BUILT INTO . . .

BUSY HANDS *There can be no letdown in any one of the critical operations required in the production of Sangamo MICA CAPACITORS That is why every Sangamo operator in each department is fully trained in her particular duty until she becomes thoroughly capable in doing her task. These operators know the importance of accuracy and maintain faithfully the Sangamo standard of excellence.*

SANGAMO ELECTRIC

ESTABLISHED 1898 . . . MICA CAPACITORS . . .

Sangamo MICA CAPACITORS



Because of the precise and accurate operations involved in the manufacture of mica capacitors, too much emphasis can not be placed upon the importance of modern equipment and adequate working facilities. The facilities used by Sangamo for gauging mica are shown in the attached picture. Other departments, utilizing equally accurate, modern, and efficient methods, for MICA SPLITTING, MICA PUNCHING, INSPECTION, and STACKING, are all vital factors in maintaining Sangamo excellence.

ARMY E NAVY

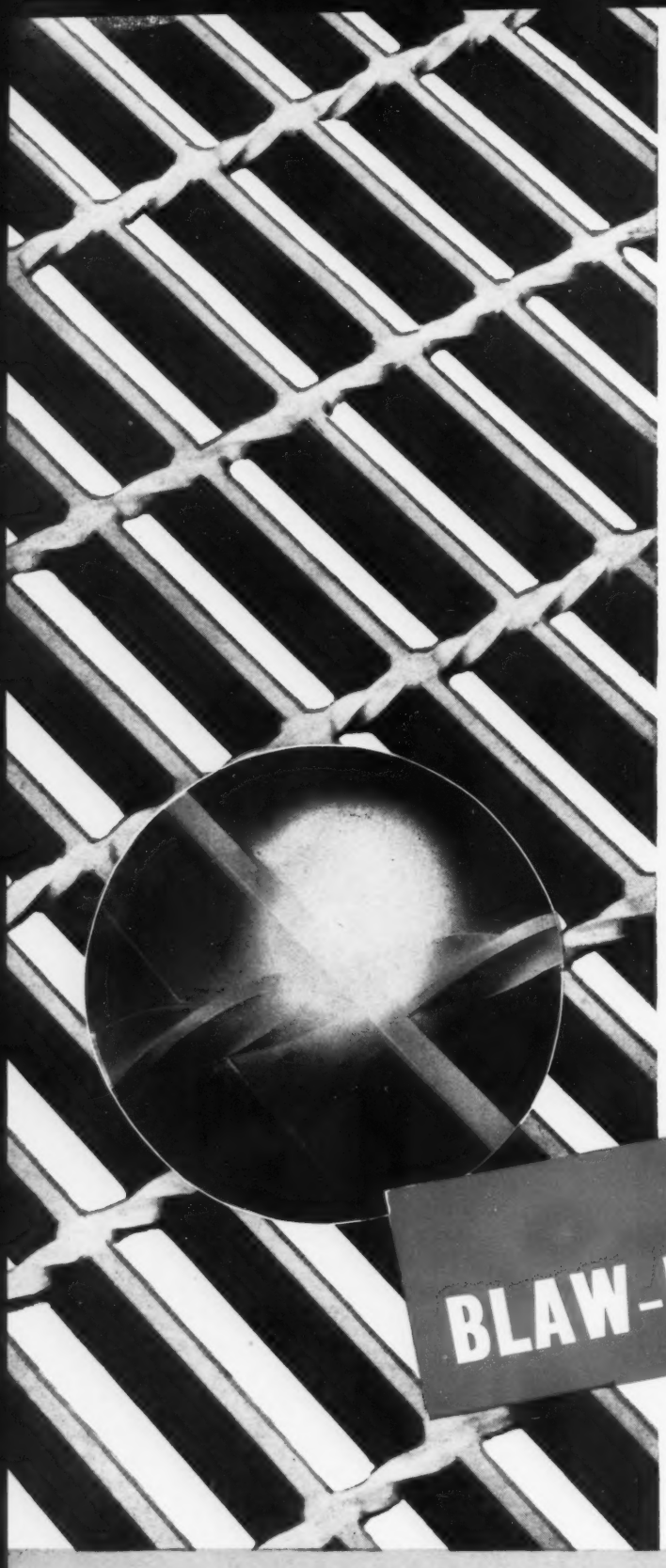
Mica Gauging

The preparation of mica to be used as the dielectric in a mica capacitor requires many steps. Splitting the laminations from the mica block is the first step, but it is only the beginning in a long and carefully controlled series of operations in the final preparation of the mica. As the electrical capacitance of a mica capacitor depends upon the dielectric constant of the mica, its thickness, and the active area of the electrodes used in the unit, these factors must be accurately controlled. In some cases several thousand or more individual mica films are used in the construction of a capacitor and the dielectric failure of any one of these pieces would result in the destruction of the entire unit. Consequently, it is readily apparent that extreme care in selecting and gauging of the individual mica laminations is of extreme importance. The dielectric constant of mica is determined by precise electrical measurements, but usually this constant is fairly uniform for any group or batch of mica of equal quality when obtained from a single source or mine.

While proficient splitting operators can split mica so that approximately 80% or more of their production will come within limits of one-half thousandth of an inch in thickness, this is not sufficiently accurate to accomplish the results desired in obtaining uniformity of characteristics. Consequently, it is necessary to gauge each mica lamination on special beam gauges, as shown in the accompanying picture. Here, trained operators select mica to thickness limits of one-fourth of a thousandth of an inch or less. This gauged mica is separated into groups according to the thickness of the lamination, and each group is then ready to be punched to the special size and shape required for the particular capacitor in which it is to be used.

COMPANY SPRINGFIELD ILLINOIS

• • • WATT HOUR METERS • • • TIME SWITCHES • • •



. . . IS IT

1 One-piece electro-forged construction? ?

2 Easy to maintain; with paint reaching entire surface? ?

3 Open to maximum area for light and air? ?

4 Self-cleaning without sharp corners to clog with dirt? ?

5 Economical and easy to install? ?

The answer to all five is YES if it's . . .

BLAW-KNOX *Electroforged* STEEL GRATING

BLAW-KNOX DIVISION
of Blaw-Knox Company
2098 Farmers Bank Building
PITTSBURGH, PA.
Offices in Principal Cities

KNOW YOUR NEAREST BLAW-KNOX DISTRIBUTOR

ALABAMA
Birmingham—McConnell Sales & Engineering Corp.

CALIFORNIA
Los Angeles—E. M. Ornitz
San Francisco—W. S. Wetenhall Co.

COLORADO
Denver—Mine & Smelter Supply Co.

DISTRICT OF COLUMBIA
Washington—Meleney Engineering Co.

GEORGIA
Atlanta—Evans L. Shuff

INDIANA
Indianapolis—Hugh J. Baker & Co.
South Be[illegible]—Edwards Iron Works, Inc.

IOWA
Des Moines—Delevan Eng. Co.

LOUISIANA
New Orleans—Arthur C. Hays

MARYLAND
Baltimore—H. T. Potts Co.

MASSACHUSETTS
Boston—Brown-Wales Co.
Holyoke—Massachusetts Sup. Corp.

MICHIGAN
Detroit—Wm. P. Favorite

MINNESOTA
St. Paul—Robert J. Wylie

MISSOURI
Kansas City—W. R. Fithian
St. Louis—Rhodes Equipment Co.

NEW JERSEY
Essex Fells—Paul G. Koch

NEW YORK
Albany—Edwin D. Shultz
Buffalo—Reecon Company, Inc.
Syracuse—George Rees

OHIO
Cincinnati—Wyman Engineering
Cleveland—H. W. Kaiser Co.
Columbus—F. L. Purdy Co.
[illegible]ledo—George J. Haase

OKLAHOMA
Tulsa—Frick-Reid Supply Corp.

PENNSYLVANIA
Altoona—Altoona Pipe & Steel Supply Co.
Philadelphia—H. T. Potts Company

SOUTH CAROLINA
Greenville—Edward McCrady

TENNESSEE
Bristol—J. G. Tilley
Memphis—Pidgeon-Thomas Iron Works

TEXAS
Houston—James A. Hall

UTAH
Salt Lake City—Harrison & C[illegible]

VIRGINIA
Richmond—W. H. Trausneck
Roanoke—Milliken Co.

WASHINGTON
Seattle—Geo. Montgomery

WEST VIRGINIA
Charleston—Fireproof Produ[illegible]

WISCONSIN
Milwaukee—Hunter Tractor & Machinery Co.

HOTPOINT ANNOUNCES...

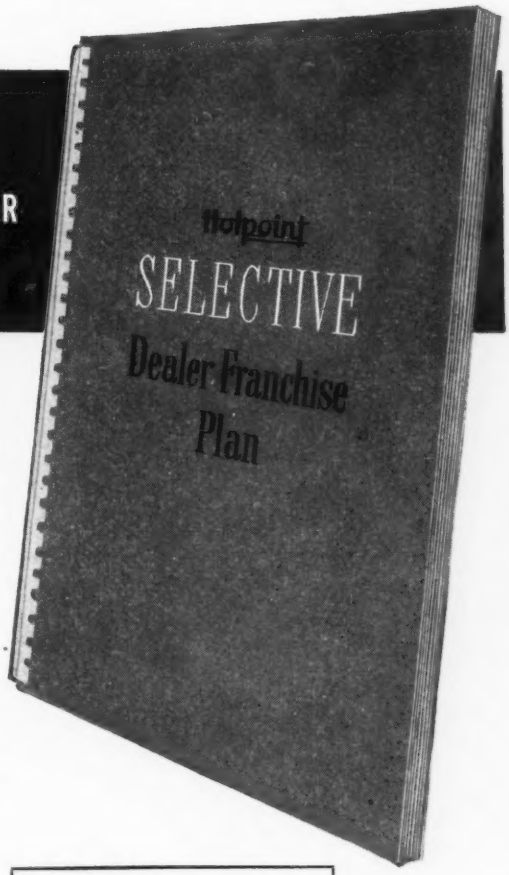
An Entirely New Dealer Franchise Plan

Hotpoint's Policy for Appliance Merchandising Is Essentially This:

A SELECTIVE DEALER FOR A SPECIFIC MARKET

A SPECIFIC MARKET FOR A SELECTIVE DEALER

Thus, Hotpoint's Policy Is Mutually Beneficial
Because It Is Mutually Selective and Protective



Painstaking research, to determine the potential of each market, is the foundation upon which a Hotpoint Selective Dealer Franchise is awarded. Being protective as well as selective, Hotpoint's Selective Dealer Franchise Plan affords an opportunity to plan and build a retail appliance business, for the present and future, on a dignified and profitable basis.

A Complete Line of Kitchen and Laundry Appliances

- ELECTRIC RANGE
- ELECTRIC REFRIGERATOR
- ELECTRIC HOME FREEZER
- ELECTRIC COMBINATION REFRIGERATOR
- ELECTRIC WRINGER-TYPE WASHER
- ELECTRIC AUTOMATIC WASHER
- ELECTRIC WATER HEATER
- ELECTRIC CLOTHES DRYER
- ELECTRIC PORTABLE-IRONER
- ELECTRIC TABLE-TYPE IRONER
- ELECTRIC DISHWASHER
- ELECTRIC DISPOSALL
- CABINET-SINK
- ALL-STEEL CABINETS

No "Postwar Babies" In Hotpoint Line

All Hotpoint appliances are beyond the promotional stage. In no sense are they "postwar babies." They were all designed, tested, and in demand before Pearl Harbor.

Hotpoint's postwar appliances will form a complete line of electric kitchen and laundry appliances that will permit the Hotpoint *selective* dealer to compete successfully for sales in all income brackets. Edison General Electric Appliance Co., Inc., 5612 W. Taylor St., Chicago 44, Ill.

Hotpoint

Dependability Assured By 40 Years' Experience

BETTER CARE LESS REPAIR

HOTPOINT REGIONAL SALES OFFICES. EASTERN: 570 Lexington Avenue, New York City 22, Plaza 3-9333. SOUTHERN: 304 Red Rock Building, Atlanta 3, Walnut 2959. CENTRAL: 1456 Merchandise Mart, Chicago 54, Superior 1174. WESTERN: Western Merchandise Mart, 1355 Market Street, San Francisco 3, Underhill 2727.

HOTPOINT

Electric Kitchens

REFRIGERATORS • RANGES • WATER HEATERS • HOME FREEZERS • WASHERS AND IRONERS • CLOTHES DRYERS • DISHWASHERS • DISPOSALLS • CABINET-SINKS • STEEL CABINETS

COPPER

. . IS BASIC

From (1500x) microscopy to pilot-plant testing, Research here seeks constant product betterment

In the General Cable Research Laboratory at Bayonne one soon becomes conscious that this unit is not just a laboratory but an institution on which the technical advance of an industry largely depends. At what speed rate can continuous annealing of copper be accomplished? How control materials for more perfect surface finish? What refinement of raw material and process specifications for specific use-applications? General Cable scientists delve deeply that the end product may be still more serviceable, of still greater uniformity, and of no greater cost.

A Grain structure of annealed hard drawn wire—X1500

B Grain refinement of Hot Rolled Rod—X200

C Elongation of grains in longitudinal section of wire—X1500

GENERAL CABLE CORPORATION

Manufacturers of Bare and Insulated Wires and Cables for Every Electrical Purpose

Stop Blinking

ONCE AND FOR ALL WITH . . .

Blinking and flickering of dying fluorescent lamps cannot possibly recur with G-E Watch Dog Starters. When this annoying condition occurs the Watch Dog stops blinking once and for all by cutting itself out of the circuit. Since there is no flow of current futile and needless starting attempts are prevented.

The Watch Dog's positive no blink feature not only prolongs the life of the starter but safeguards the ballast, conserves current and reduces maintenance. Install G-E Watch Dog Starters now and forget all about annoying blink and flicker.

Would you like to have further details about the G-E Watch Dog? Just fill in and return this coupon.

Hear the General Electric radio programs: "The G-E All Girl Orchestra" Sunday 10 P.M. EWT, NBC. "The World Today" news every weekday 6:45 P.M. CBS.

BUY WAR BONDS AND KEEP THEM

Appliance and Merchandise Dept.,
General Electric Co., Section G252-18
Bridgeport, Conn.

Gentlemen:
Please send me your bulletin "How to Use G-E Fluorescent Accessories for Best Lighting Results."

Name .....
Company .....
Address .....
City ..... State .....

GENERAL ELECTRIC

Silicone Rubber (218)

General Electric has announced silicone rubber, a new material which it claims retains its elastic properties at temperature as low as 60° below zero or as high as 575°. Chemically silicon is closely related to carbon. Raw materials from which it is made are easily available and silicone rubber can be prepared in a wide variety of physical properties. In its present state of development, it is not suitable for tires and other uses where high tensile strength is required, according to the announcement, but has many wartime uses.

Resistance Tester (219)

A new model ground resistance tester has been introduced by Associated Research, Inc. It is said to be particularly adapted to arid or wet regions where extremes of dryness or moisture are found. The model has four ranges, 0-3, 0-30, 0-300, 0-3,000 ohms. It has a self-contained power supply; direct readings; is portable.

Battery Plug (220)

Cannon Electric Development Co. has announced a new heavy-duty battery plug. This 600-amp. plug has a switching device and two 600-amp contacts. Its mating receptacle, mounted on engine frame or other location, is the standard Cannon Type GB-3-34 CDS receptacle. Over-all length is 7 in., width at engaging end, 2 5/16 in. Shell material is a special molded phenolic of high impact qualities. The 600-amp. contacts are leaded copper, with phosphor bronze spring; low amperage switching contact is brass, silver plated; wire accommodations are No. 8 stranded and No. 4-0 stranded.

Service Elevator (221)

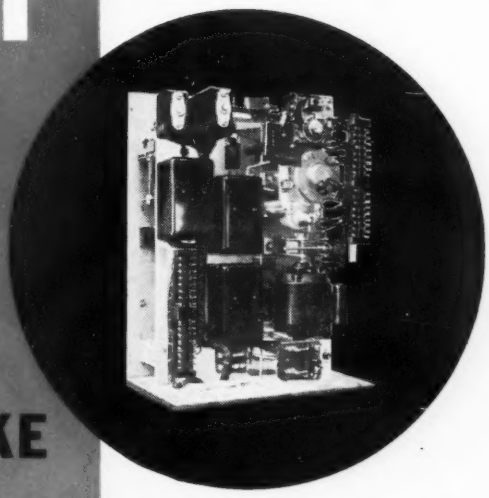
Revolator Co. has announced a portable service elevator for overhead lighting fixtures, heaters, etc., where height is not greater than 24 ft. The unit is telescopic and when collapsed is 7 ft. high. It is made of structural steel, is claimed to be light weight and rigid. Two men with tools can be accommodated on the platform, according to the announcement.

Degreasing Solution (222)

Colonial Alloys Co., Technical Processes Division, is offering a degreasing solution known as percyclodiene, which it claims is non-toxic, non-corrosive. It is available for use in degreasing machines for war and essential civilian industries.

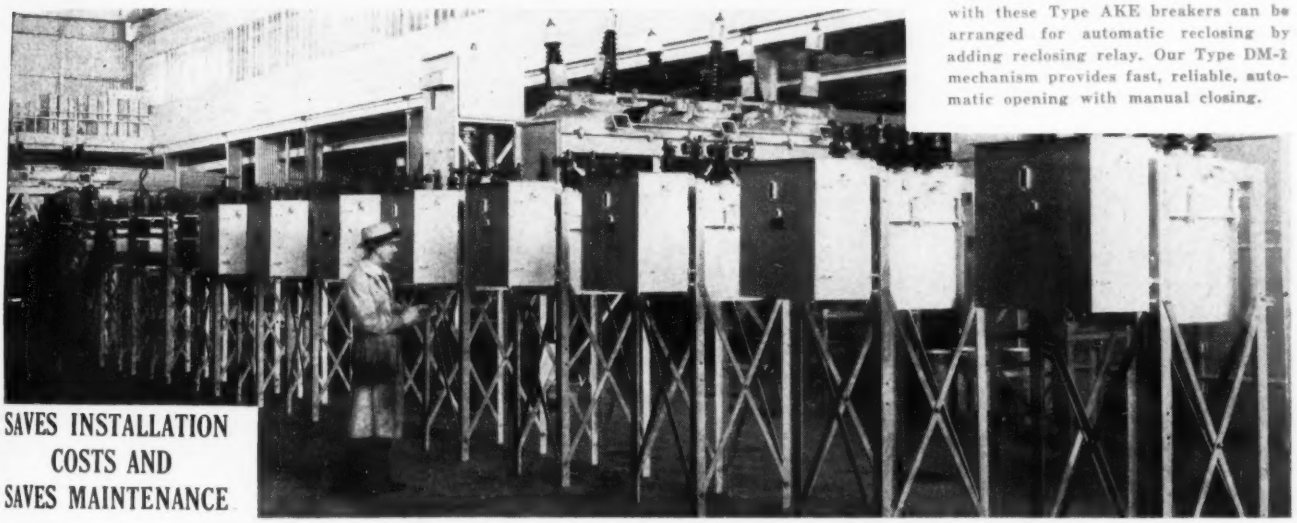
Here's FAST FAULT CLEARANCE for Distribution CIRCUITS to 15 kv. inc.

PACIFIC ELECTRIC TYPE AKE OIL CIRCUIT BREAKER . . . .



Reclosing Motor Mechanism

The Type MJ-1 Motor Mechanism used with these Type AKE breakers can be arranged for automatic reclosing by adding reclosing relay. Our Type DM-1 mechanism provides fast, reliable, automatic opening with manual closing.



SAVES INSTALLATION COSTS AND SAVES MAINTENANCE

Shop View of Type AKE-25, 7.5-kv., 400 and 600 amps. Made also in Type AKE-40, 15-kv., 600 amps. Both 50,000 kva.

THIS breaker has proved reliable for fast fault clearance on utility lines the nation over, and its Spring-Operated Motor Mechanism, an exclusive feature, provides for fast and constant closing speeds.

A small motor operating on AC or DC automatically winds a strong spring which, when tripped, gives fast closing. Any number of reclosings may be had on transient faults. First reclosure may be immediate. For AC operation, its supply circuit is simple as no rectifiers are needed, saving installation costs. Moreover, the breaker is factory tested and shipped assembled, saving expenses and time during installation. Equipped with the Pacific Electric Expulsion Contacts, arcs extinguish instantly, clearing the circuit quickly and permitting fast reclosing. Fast arc extinguishment saves contacts, oil and upkeep.

Ask for full details on the sound design of this "AKE" Pacific Electric Breaker.

●

C. H. Cutter **1015 Securities Bldg.** **Seattle 1, Wash.**	**G. B. Kirkwood** **437 S. Hill St.** **Los Angeles 13, Calif.**	**Northwest Supply Co.** **909 E. 2nd St.** **Butte, Mont.**
J. E. Redmond Co. **448 W. Madison St.** **Phoenix, Ariz.**	**H. R. Slocum** **P. O. Box 1920** **Honolulu, T. H.**	**R. Ackerman** **318 Dooly Block** **Salt Lake City 1, Utah**

Other Representatives in Principal Cities

Pacific Electric Mfg. Corporation

5815 THIRD ST., SAN FRANCISCO 24, CALIF. P. O. BOX 419, GARY, INDIANA

BLACKBURN Hy-Strength CONNECTORS

In a Nutshell—

Here are the 7 Advantages* that Cut Your Maintenance Costs!

Millions in use throughout the world

★ They're the strongest and most durable connectors made. That's because they're the only line of connectors made of DURONZE, which tests show is 75% stronger than hard-drawn copper, and more non-corrosive than pure copper.

★ Because of this exclusive high-strength construction, BLACKBURN CONNECTORS will not distort, and can be used over and over again —a real economy.

★ Conductivity of the joint is actually better than the solid wire itself.

★ Reinforced pressure bar makes a strong connector still stronger.

★ All corners rounded—will not nick wires or cut lineman's glove.

★ Machined to close tolerances, assuring accurate fit of nut and maximum strength of thread.

★ Full threads on screw for maximum strength.

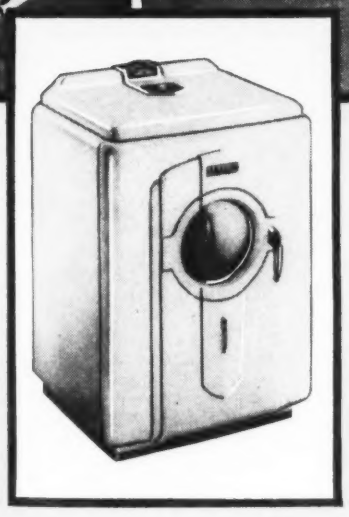
In short, BLACKBURN Hy-Strength CONNECTORS are trouble-free on the line, and definitely cut your maintenance expense. Yet they cost no more than ordinary connectors.

Over 100 Conveniently-located Jobbers' Stocks

JASPER BLACKBURN PRODUCTS CORP.

Main and Clinton Sts. • ST. LOUIS (6), MO.

Builders of Quality Connectors for Over 10 Years



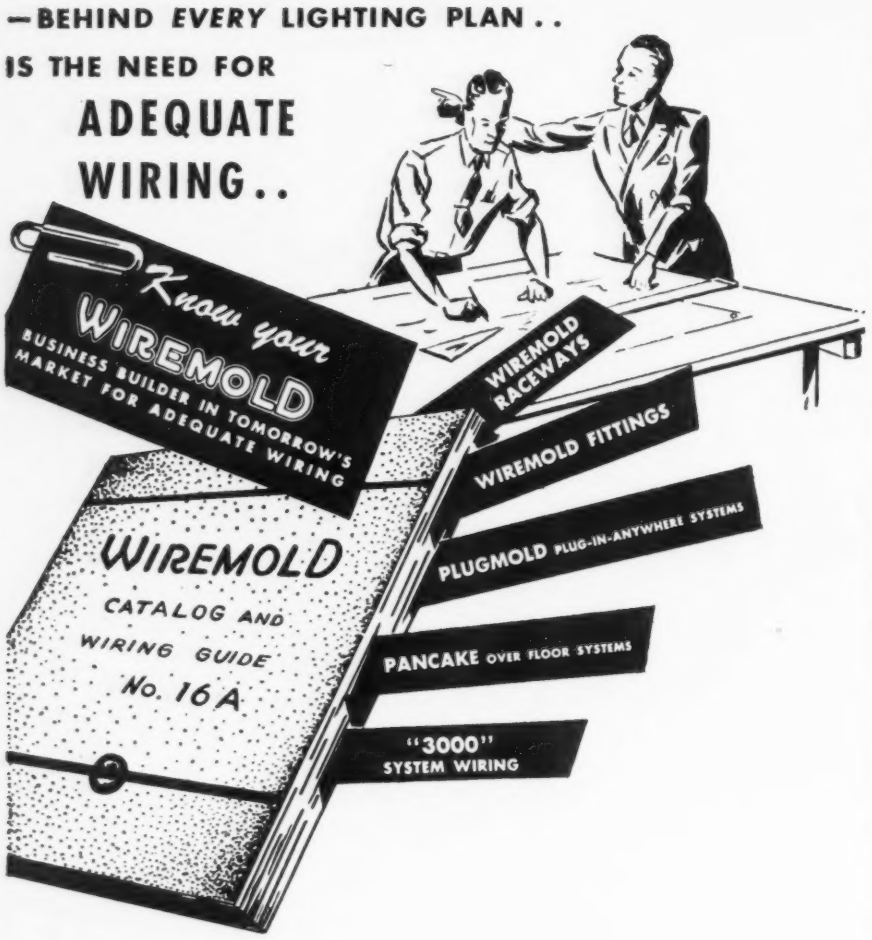
Doesn't take more than the word "*Bendix*," to make women sit up and take notice! They're all ears, all eyes, and all ready for the Bendix Automatic Home Laundry—so pre-sold on its unique laundry advantages, they're signing up even now, in thousands of Bendix dealers' showrooms!

We must admit that the greatest Bendix sales effort is being made by the more than 300,000 women who already own pre-war Bendix machines. They're aiding Bendix goodwill and sales by word-of-mouth—over the back yard fence! We at Bendix are helping dealers, too, with the greatest sales promotion in our history—with National Ads, National Radio, Electric Signs, Store Displays and Dealer Materials!

Any way you look at it, the Bendix dealer is a lucky guy. More women want to buy the Bendix than any other machine. They have the money, and the minute the new Bendix is released, that money is going to change hands! No wonder they're all saying—"All I Want Is a Bendix!"

BENDIX automatic Home Laundry

Bendix Home Appliances, Inc., South Bend, Indiana, Pioneers and Perfectors of the Automatic "Washer"



THE WIREMOLD CATALOG IS YOUR GUIDE TO WIRING PLANNED FOR TOMORROW'S NEED

Versatile Wiremold Raceways and Fittings efficiently meet the installation requirements of all modern lighting systems . . . whether incandescent, fluorescent or other newly developed light sources are used. In the Wiremold Catalog and Wiring Guide you will find the many sizes of raceway and the full range of fittings needed to plan either a complete basic wiring layout for new building construction or the wiring extension and relocation necessary in modernizing existing installations. Wiremold methods and materials are not new to you. They were your standby in prewar years. They have been widely used to speed work, save time and step up lighting standards in war plants throughout the nation. They stand ready now to become an essential part of your post-war business planning. If you have not received a copy of Wiremold Catalog No. 16A, write us at once.

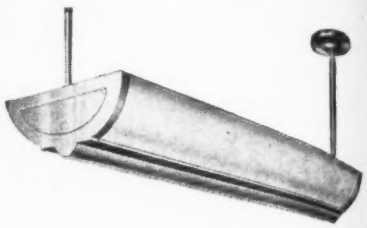
THE WIREMOLD CO., HARTFORD 10, CONN.

ELECTRICAL CONTRACTORS

Business publications like these, with aggregate circulation of over 240,000 monthly among your prospects and customers, carry Wiremold advertising messages designed to HELP YOU BUILD BUSINESS. Tie in with this aggressive promotion program.

F Unit (223)

The Edwin F. Guth Co. has announced that its Cadet unit, installed recently in West Point study rooms, is now available commercially on suitable priority. Designed for critical eye tasks in offices, drafting rooms and schools, the Cadet is described as a luminous-indirect type luminaire. It is made in 48, 60 and 96 in. lengths for 40 and



100 watt F lamps. It is suspended 24 to 30 in. beneath the ceiling in individual or end-to-end lighting arrangements. Translucent cream-white deflectors are said to deliver in the ratio of 90% upward and 10% downward. Fixture surfaces are less than one candle-power-per-square-inch, it is stated, to assure correlated relations of brightnesses throughout installation.

Light Selector (224)

Embodying contact-light selector equipment for four runways, a selector cabinet has been designed by Westinghouse Electric & Mfg. Co. The cabinet occupies a space 5 x 2 x 4 ft. and is completely assembled and internally wired at the factory. By use of this unit, the operator in the control tower selects the desired runway and light intensity by pressing the proper buttons.

Lock Nut (225)

Adel Precision Products Corp. has a new spring steel lock nut, called the Stalock and which it claims offers 360° contact with screw threads. It is available in two types: for sheet metal screws, standard sizes No. 4, 6, 8, 10, 14; for coarse machine screw threads, No. 6, 8, 10, ¼ and 5/16 in. Special shapes and sizes will be built on request.

Plating Solution (226)

Colonial Alloys Co., Technical Processes Division, has announced a dipping solution for copper plating on aluminum and its alloys. The dip is used at room temperature in a steel, wood or ceramic container; does not require venting; has a long life and is not sensitive to drag-out, normal contamination or dilution, the manufacturer claims.

Vacuum Cleaner Design (227)

Eureka Vacuum Cleaner Co. has announced that a newly developed motor-driven "disturbulator" will be incorporated in its vacuum cleaner design when production is resumed. According to the announcement, this device is designed to gently loosen embedded dirt as well as to pick up surface litter.

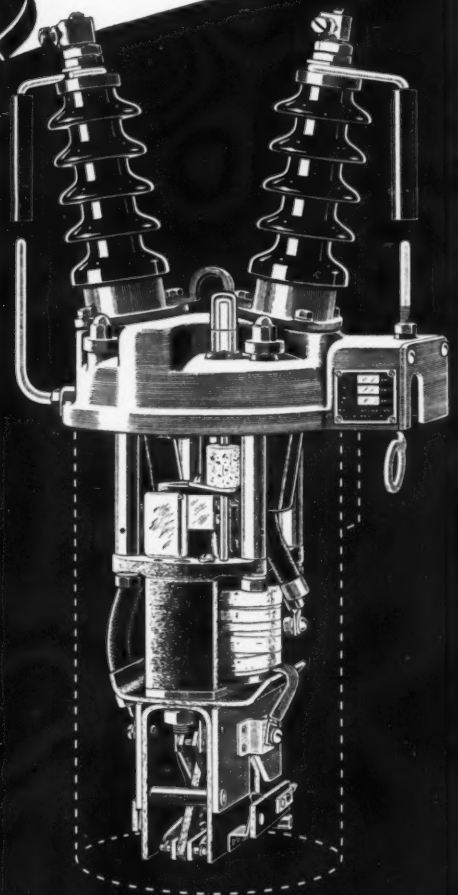
Electric Heaters (228)

Economaster Products Co. announces that its electric heaters are now in production. The heater is a portable plug-in type, is said to feature diamond grid circuflector, glo heat element, natural draft, infrared rays.

...THE TYPE "H"

KYLE AUTOMATIC OIL CIRCUIT RECLOSER

OFFERS Dual time current characteristics Dependable hydraulic timing 5 Different coil ratings Safety to the operator



CUT-A-WAY VIEW OF TYPE "H" KYLE OIL CIRCUIT RECLOSER

RATINGS: Volts—2400 to 15,000; Amperes—5 to 50; Tripping Current—10 to 100 Amperes; Interrupting Current—150 to 1200 Amperes.

The Type "H" Kyle Automatic Oil Circuit Recloser will keep your main lines open...increase your revenue...reduce your operating costs.

Check these Kyle features which assure the automatic clearing of all temporary faults and the isolation of feeder lines where permanent faults develop.

ELECTRICAL FEATURES

CHOICE OF OPERATING CHARACTERISTICS:

1. *Fast Opening* on first and second operations. *Time Delay* Opening on third and fourth.

2. Fast Opening on *all four* operations.

3. *Time Delay Opening* on *all four* operations.

DOUBLE, FAST ACTING CONTACTS:

1. Prevent burning of contact surfaces by high speed opening and closing.

2. Constructed of special arc-resistant alloys.

3. Self-cleaning and cannot chatter.

PROTECTIVE FEATURES:

1. Lightning protection is provided by spark gaps on both bushings which dissipate surges to the ground.

2. Thermal trip will lock out Recloser to prevent damage from high overloads over an extended period.

MECHANICAL FEATURES—Hydraulic Control Mechanism: Provides accurate timing on all operations . . . time delay opening of the Recloser when desired.

Coils are easily replaced by removing coil leads and two nuts. Contact assembly is replaced as a unit by removing two nuts and contact leads. Steel tank is of one piece design with no openings below oil level.

The Type "H" Kyle Recloser is compact in size . . . 27¼" overall height . . . 8" tank diameter. Light in weight . . . 65 pounds complete with oil. Inexpensive single bolt mounting.

A counter is provided to count each Recloser operation. An oil level gauge indicates the proper oil level.

SAFETY FEATURES—Operating handle is trip-free. Recloser may be manually closed without danger to operator. When the Recloser is in the open position, vibration or jar cannot cause it to fall closed accidentally.

Steel tank and cover are electrically dead. Provision is made for grounding them.

The only live parts are the upper terminals on the bushings, providing easy, safe access to the operating handle.

Ask your Line Material Representative for full information on the Type "H" Kyle Automatic Oil Circuit Recloser.

MADE BY KYLE CORPORATION SOUTH MILWAUKEE WISCONSIN

KYLE Circuit Breakers are Designed and Manufactured for LINE MATERIAL COMPANY

QUESTION: *Can You Specify*

THE ONE THING THAT YOU REALLY WANT

in an insulator----------*any* insulator?

Be it a suspension, a pintype, a switch insulator, a bushing -- it makes no difference -- M & E values are established.

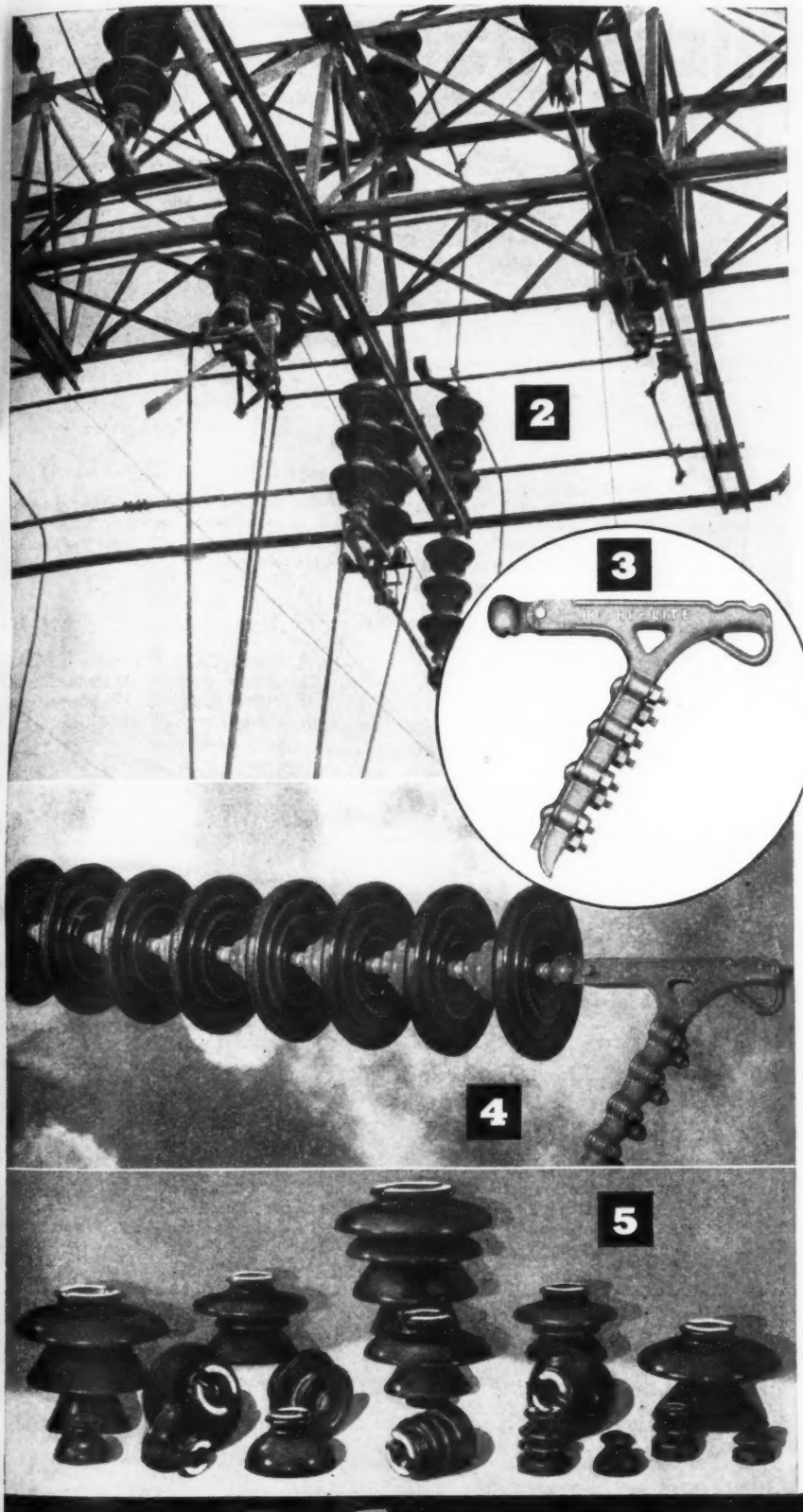
When it comes to those things covered by specifications, you are dealing with strictly tangible factors.

But when you recommend a piece of insulation for your system, you assume M & E ratings and quickly go on to a much bigger question -- how well and how long will these insulators stand up in service?

Here are a few of O-B's concrete answers to that question.

YOU TRUST PORCELAIN -- Power men have learned from broad experience to trust porcelain insulation -- it remains unaffected by almost any operating hazard. Inside O-B bushings, the inherent stability of porcelain insulation is protected and reenforced by the presence of oil, and it has been sealed off from exposure. These bushings have a ruggedness and an ability to stand up under extreme demands that has actually established a new standard for bushing performance. They require a minimum of attention or out-of-service time for maintenance. O-B bushings give you reliability where it is really appreciated.

ALL ALIKE -- ? Nowhere do the "undefinable" elements of an insulator play as prominent a part as in switch and bus service. So many rigid standards are established that it has sometimes been assumed all differences have disappeared. But, again, M & E specifications are at best only indicators of re-



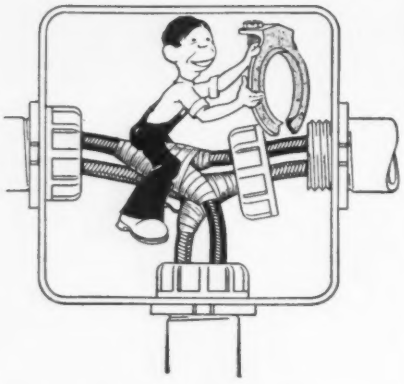
liability — a quality that must be imparted to the insulator by experience and manufacturing skill that defy definition. O-B can offer proof of accomplishment here in the form of both the most extensive and the oldest service records in the industry. Facts like these can't be denied.

CORRECT MATERIAL — More important than any one hardware design or single feature is the fact that O-B has its own foundries and forge shops; making a choice of material or manufacturing method no handicap to the designing engineer. He has no restriction placed upon his ideas — the facilities are at hand to interpret them to best advantage. Malleable iron, steel, brass, aluminum, can all be utilized where their characteristics are best applied. As an insulator manufacturer, O-B has an exclusive advantage in the extent of its metal fabrication facilities. This advantage shows up in the service of O-B hardware.

MINIMUM STRENGTH — Because suspension insulators perform as links in a chain, individual strength is the only correct criterion of reliability. On this account, O-B was the first to establish a minimum strength rating, made possible by highly perfected manufacturing control. With O-B, you get the kind of strength that counts, because you can count on it! You can't specify all the little things that add up to this big improvement — you don't have to. Simply put "O-B" on your order.

CRITICAL SERVICE — Any pintype interposes only one dielectric barrier between potential and ground. Many lines have the added operating hazard of no shielding. If it can be said that one kind of insulator must be better than any other, that kind is a pintype! Recognizing this, O-B has always emphasized the finest possible quality even in the smallest pintype models, and has never allowed them into become the "stepchild" of larger, more expensive insulators. O-B pintype-insulated lines that are now finishing their second world war offer proof of this. No set of formal specifications can define those things that produce such reliability, but "O-B" on your order will secure it for you.

Ohio Brass
MANSFIELD, OHIO, U.S.A.
CANADIAN OHIO BRASS COMPANY, LIMITED, NIAGARA FALLS, ONTARIO
2593-H



HOW T&B GROUNDING WEDGES

Save on Installation Work and Material for Old or New Work

HERE'S HOW

Simply loosen your standard conduit bushing, slip your T&B Patented Grounding Wedge over the wires without disturbing them, and screw your bushing back into place. To complete the job, you merely tighten up the Wedge with a screwdriver.

These T&B Grounding Wedges are Approved by the Underwriters Laboratories either with or without the use of jumper wire. They form a mechanically and electrically perfect bond between conduit and outlet box and provide one continuous metallic path to the ground, replacing jumper wires at boxes.

Made of bronze, the flange of the Wedge is accurately machined to fit easily and snugly into the knockout. They come in thirteen sizes from ½" to 6" and, like all other T&B products are sold through the service organizations of T&B Distributors exclusively.

Write your nearest T&B Office for Bulletin S-7. It gives full information on these T&B Grounding Wedges as well as on the complete line of T&B Built-in Solderless Ground Fittings.

The Thomas & Betts Co., Incorporated
103 N. Santa Fe Avenue
Los Angeles 12, Calif.

The Thomas & Betts Co., Incorporated
542 Natoma Street
San Francisco, California

Paul Douden & Co.
1645 Wazee Street
Denver 2, Colorado

F. A. Strohecker
301 Eyres Bldg.
2207 First Ave., S.
Seattle 4, Washington

T&B

THE THOMAS & BETTS CO.
INCORPORATED
manufacturers of electrical fittings since 1899
ELIZABETH, 1, NEW JERSEY
In Canada: Thomas & Betts Ltd., Montreal

BULLETINS

data books, etc.

Postwar Lighting (229)

Postwar lighting design is the subject of a new Westinghouse booklet entitled, "Seability for Tomorrow." Suggesting uses for the new slimline and circular fluorescent lamps, this booklet pictures possible installations; supplements each illustration with a paragraph of text. Included are suggestions for homes, shops, displays, schools, offices, theaters, bars, assembly lines.

Standards (230)

The Varnished Tubing Assn., Inc., has published in 8½ x 11 size the new standards covering tubing and sleeving made from cotton, rayon, nylon and glass. The new standards include the physical and electrical characteristics of the different standard grades available and the manner in which they should be designated when ordered.

Store Lighting (231)

"Light to Build Customer Traffic" is the title of another in General Electric Co.'s series on postwar lighting. In it are presented unusual lighting ideas suggested by Wurdeman & Becket, Los Angeles architects, to increase sales and store traffic. The suggestions are particularly adapted to women's apparel shops.

Industrial Electronics (232)

General Electric Co. is offering a bulletin entitled "Fundamentals of Industrial Electronics" and containing a reprint of a series of articles by C. M. Chute, G-E application engineer at Detroit. The articles were published originally in "Steel."

Arc Welding (233)

C. E. Phillips & Co. is offering a bulletin entitled "Arc Welding in the Maintenance and Construction of Tools and Dies" and containing engineering data on crucible arc electrodes for tool and die welding. Included are data on deposit characteristics, heat treatment, physical properties, application procedures.

Aircraft Controls (234)

Hart Mfg. Co. is distributing a bulletin giving data on aircraft relay and electrical control devices. Catalogue information on the various units is given and a condensed rating table and index is included.

Electric Hand Tools (235)

Precise Products Co. describes its Precise-35 high-speed electric hand tool in a four-page booklet entitled "More Power to You." This tool is designed to operate at 35,000 r.p.m., develops 1/6 hp. and weighs 35 oz.

D-C Supply (236)

A folder dealing with high-voltage d-c supply has been released recently by General Electric. The bulletin describes its metal-enclosed equipment.

Micromotors (237)

A. G. Redmond Co. has issued a four-page specification folder covering its standard Type L light-weight, shaded pole a-c micromotors. These units are in sizes up to 1/40 hp.

Electric Heaters (238)

Electric Air Heater Co. has issued new wholesaler, trade and consumer price sheets. These sheets give data on Electromode electric unit heaters from 1.5 to 60 kw. and prices on switches, contactors and thermostats.

Furnace Equipment (239)

Electric equipment for arc furnaces is described in a new bulletin issued by General Electric Co. Covered are the amplidyne control, metal-clad switchgear and furnace transformer.

Ceramic Capacitors (240)

A handbook containing information on ceramic capacitors has been prepared by the Electrical Reactance Corp. An ASA color code is included in the data.

ELECTRICAL WEST, 68 Post St., San Francisco, 4, California

Please send me information about following CIRCLED items:

200	201	202	203	204	205	206	207	208	209	210
211	212	213	214	215	216	217	218	219	220	221
222	223	224	225	226	227	228	229	230	231	232
233	234	235	236	237	238	239	240			

Name . . . . . Company* . . . . . Title* . . . . .

Address . . . . . .

* Please include your company's name and your position, as we cannot ask manufacturers to furnish literature unless you do.

TRUMBULL

DISTRIBUTES · · CONTROLS · · SAFEGUARDS · ·

ELECTRICITY FOR LIGHT AND FOR POWER

• Trumbullist, a general catalogue of Trumbull products with essential illustrations, is published once or twice a year. We shall be glad to place your name on our list to receive this Trumbull service.

L. V. D. (LOW VOLTAGE DROP) MAIN FEEDER SYSTEM

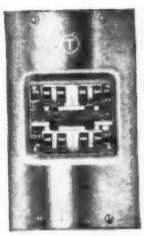
SMALL MOTOR STARTERS

CONTROL CENTERS

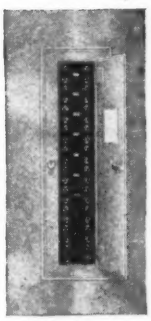
FLEX-A-POWER AND FLEX-A-PLUG PLUG-IN SYSTEM

HEAVY DUTY INDUSTRIAL SWITCHES

MANUAL STARTERS

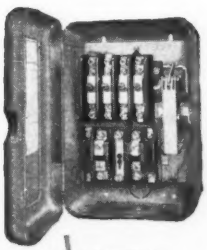


MULTI-BREAKERS

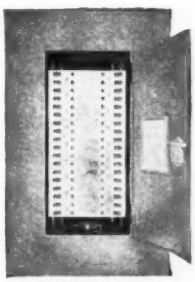


SWITCH AND FUSE LIGHTING PANEL BOARDS

CIRCUIT BREAKERS



MAGNETIC STARTERS



MULTI-BREAKER PANEL BOARDS

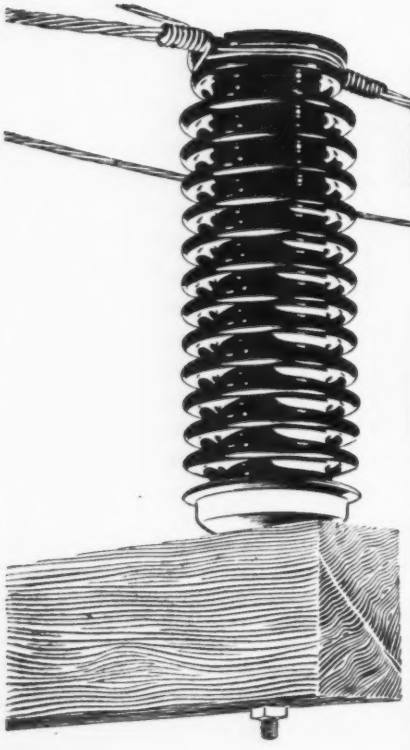
SWITCH BOARDS

THE TRUMBULL NAME PLATE IS KNOWN TO ELECTRICAL MEN IN EVERY BRANCH OF THE FIELD.

•Trumbull products cover an unusually comprehensive assortment of material for complete systems of interior electrical distribution and control. This advertisement features only the principal broad groupings of these products. Trumbullaid circulars and bulletins available on request.

THE TRUMBULL ELECTRIC MANUFACTURING COMPANY • PLAINVILLE, CONN. • A GENERAL ELECTRIC ORGANIZATION

OTHER FACTORIES AT NORWOOD (CINN.) O. — SEATTLE — SAN FRANCISCO — LOS ANGELES

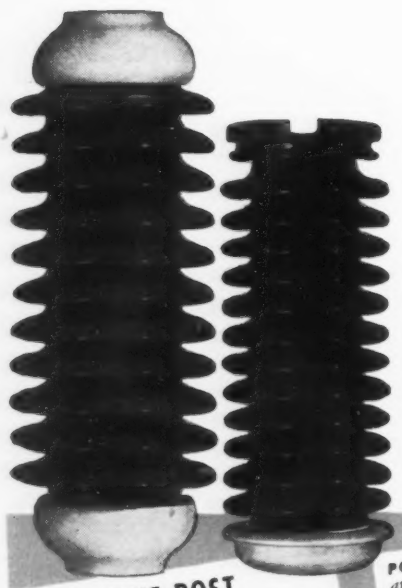


WARTIME CONSTRUCTION

need not be "TEMPORARY CONSTRUCTION"

TRANSMISSION LINES ON WOOD POLES AND LAPP LINE POSTS ARE LONG-LIFE, LOW-TROUBLE LINES . . . . . THAT GO UP FAST AND USE A MINIMUM OF MATERIAL

• On a cost-per-year basis, transmission line construction on wood poles with Lapp Line Posts is most practical and economical. And today, if load demands make it necessary for you to build a new line under war-emergency restrictions, you'll find this same construction will require least in critical materials, least in man power. The extra height of Lapp Line Posts will give your line better clearance, or even in some cases permit use of shorter poles. Coordinate necessity measures with your long-time planning and build low-cost long-service lines—on Lapp Line Posts.



LAPP LINE POST and STATION POSTS on your system offer . .

POWER ARCOVER. *Flashover and leakage distances are not appreciably lowered by damage —even loss of several petticoats.*

NO PUNCTURE. *Puncture path in Lapp Post design is as great as flashover path. Insulator will flash over rather than puncture.*

NO CRACKING. *One piece post body, not subject to bursting from tension strains created by thermal changes in nested parts.*

RADIO INTERFERENCE. *By virtue of design factors alone, radio interference is permanently prevented at rated neutral voltage.*

NO CLEANING. *Fog-type design preserves uniform leakage path, prevents leakage flashover, makes the unit "self-cleaning."*

MECHANICAL RUGGEDNESS. *Stones or bullets deflect off, or rupture petticoats, leaving post body intact and insulator secure.*

Lapp

ARMY (E) NAVY

LAPP INSULATOR COMPANY, INC., LE ROY, N. Y.

World War I Memorial

Give them a memorial that lives

They fight for an ideal—and the ideal revolves around their own home towns, and the future of their families. This ideal can best be perpetuated by a memorial that benefits these families, and typifies a practical peace.

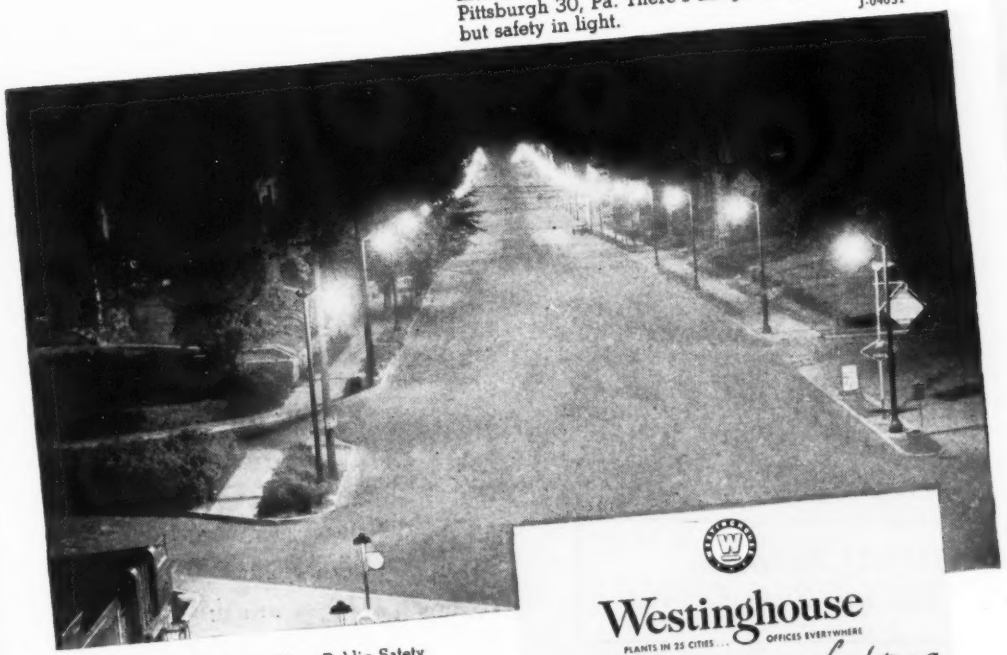
A memorial that will aid the future of their families day after day, is a Public Safety Lighting System. It will provide greater individual freedom, safety after dark, safety from traffic accidents, burglaries, robberies and property damage.

This memorial will also be a reminder of the administration that abolishes darkness . . . the darkness which encourages delinquency, breeds crime, complicates police work and undermines public confidence.

Many cities are today studying this problem with the aid of Westinghouse street lighting engineers who have years of experience in this work. These engineers are equipped with information and data from many cities and towns, much of which applies to your own problem.

The story of good Public Safety Lighting is graphically told in a new Westinghouse book that contains facts helpful to civic leaders. Ask your electric power company for your free copy of "Target for Tonight" or write Westinghouse Electric & Manufacturing Company, P. O. Box 868, Pittsburgh 30, Pa. There's danger in darkness . . . but safety in light.

J-04031



For World War II—a Public Safety Lighting System will memorialize better living . . . safety for the individual . . . the end of brutalities that flourish in the darkness. It will symbolize an enlightened world, an end to blackouts forever.

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

Public Safety Lighting

This advertisement appears in American City for February, 1945

Read this suggestion . . . as presented to civic officials through the advertisement reprinted here.

We suggest that you make sure civic officials and citizens' civic organizations have complete data on the benefits of good street lighting.

J-04026

A PROJECT CLOSE TO THE HEART OF YOUR COMMUNITY

Good Engineering is

. . . and Nowhere is that More True Engineering. Here are Six Examples

1. RIGHT PROPORTIONS FOR HEAVIER LOADS

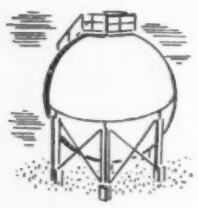
REASONS WHY Allis-Chalmers uses *shell-type* construction for all large, high voltage power transformers are both simple and basic:

a) Better distribution of impulse voltages through vertical disc coils, which give less capacitance to ground;

b) Greater dielectric strength, through use of solid insulation between coils, in combination with vertical oil ducts;

c) Sturdy bracing against over-currents, with 80% of windings enclosed in steel.

2. ROUND SHAPE PREVENTS BULGING

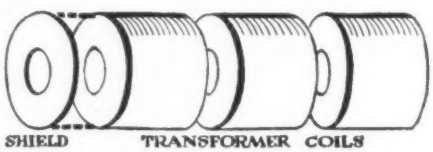


A TRANSFORMER COIL naturally tends to assume a circular shape under short circuit conditions. Therefore, it's good sense to avoid deformation stress by making coils circular *to begin with*. That's one reason why Allis-Chalmers uses circular coil construction on all power transformers.

Another reason: Circular coils can be wound with uniform tension at all points . . . without snubbing at corners. Conductors need no pounding to force them around sharp bends . . . no stress is built into the coil.

Thus a round coil shape is naturally best, both from the standpoint of efficient winding, and fault-free operation.

3. SIMPLE SURGE PROTECTION



THE KEY to voltage surge protection in an Allis-Chalmers shell type transformer is *overall design* —not shielding. Good voltage distribution is built right into shell type construction.

Allis-Chalmers *does* use a shield, however — an ideally simple disc which is connected to the line and placed next to the line-end turns of the transformer.

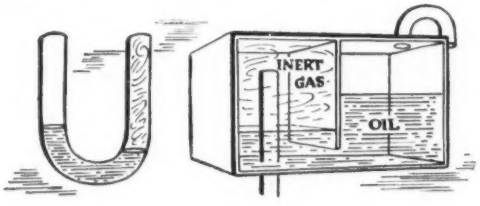
Since the shield is a flat metal plate insulated and installed the same as the coil discs in the transformer, it introduces no points of high stress between the line and distant coil turns. By the same token, it cannot interfere with free oil circulation.

Invest in ALLIS-CHALMERS

Applied Common Sense

than in Power Transformer from ALLIS-CHALMERS Practice:

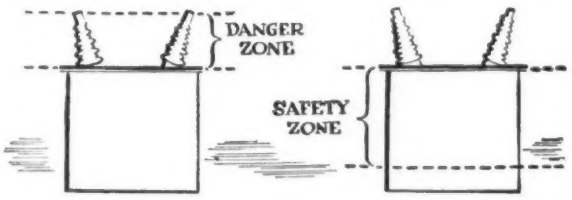
4. VALVELESS INERT GAS REGULATION



IT'S JUST GOOD SENSE to want to avoid a complicated valve system of regulation when you protect transformer oil with inert gas. For this reason, Allis-Chalmers offers you an amazingly simple Oil-Sealed tank, which operates at low pressure, and on the U-tube principle.

The Oil-Sealed system has no reducing valves, no moving parts to wear and cause trouble — *requires minimum maintenance.*

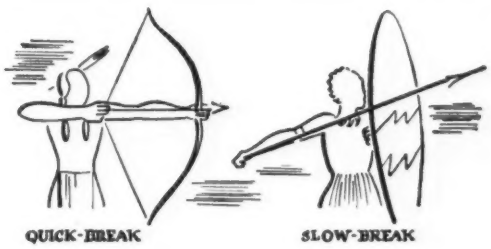
5. OUT OF THE DANGER ZONE



THE SIDE of the transformer tank is both the safest and the most convenient location for no-load tap changer operating handles, so that's where Allis-Chalmers puts them.

With the operating handle and position plate at the *side* of the transformer tank, rather than on the cover, tap positions can be observed from ground level while the transformer is in service. It's easy to change tap positions, too.

6. STORED ENERGY FOR QUICK-BREAK ACTION



FAST contact separation means short arcing time, less burning, and consequently longer life for arcing contacts.

That's why Allis-Chalmers designs its power transformer load-ratio-control mechanisms to operate on the quick-break principle of stored energy — which contrasts with slow-break as shooting an arrow contrasts with throwing a spear.

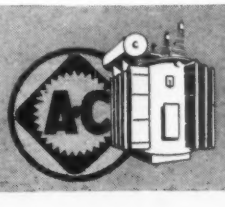
Quick-break action *snaps* contacts from one position to the next, without time for pitting or burning!

Get the full story on sturdy, reliable power transformers from your nearby A-C district office, or write directly to ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN.

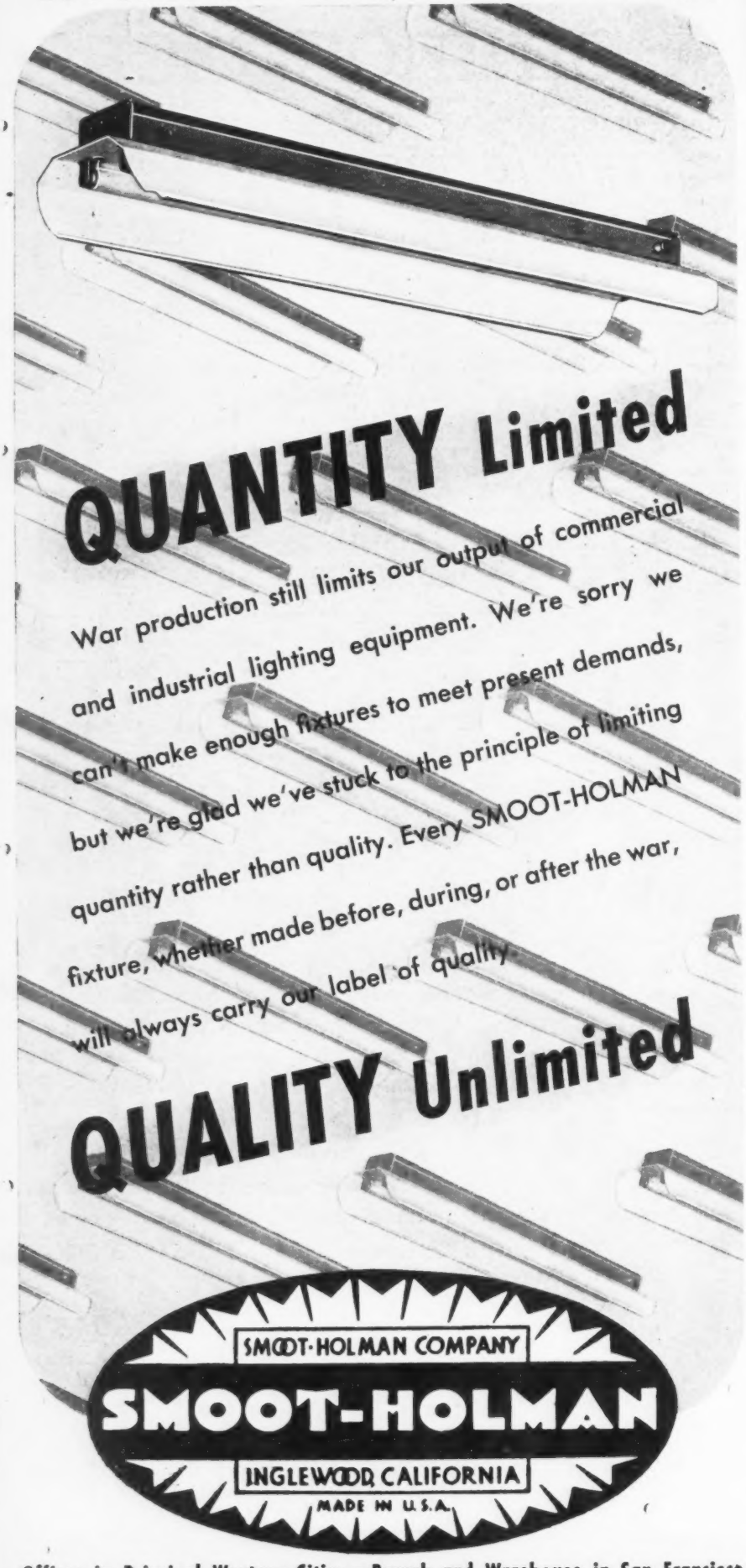
♪ *Tune in the Boston Symphony, Blue Network, every Sat. Eve.*

A 1791

Power Transformers



BUY U. S. WAR BONDS AND HOLD THEM!


QUANTITY Limited
War production still limits our output of commercial and industrial lighting equipment. We're sorry we can't make enough fixtures to meet present demands, but we're glad we've stuck to the principle of limiting quantity rather than quality. Every SMOOT-HOLMAN fixture, whether made before, during, or after the war, will always carry our label of quality.
QUALITY Unlimited
SMOOT-HOLMAN COMPANY
SMOOT-HOLMAN
INGLEWOOD, CALIFORNIA
MADE IN U.S.A.

Offices in Principal Western Cities — Branch and Warehouse in San Francisco

BOOKS
you may want

AIR COMPRESSORS, by Eugene W. Feller, 460 pages, 5¼ x 8¼ index, 414 illustrations, McGraw-Hill Book Co., $4.50.

This is a practical volume that will be of particular interest to the operating engineer and to the mechanical engineering student, also any one who may be responsible for purchasing compressors will find this book of valuable assistance.

The text covers the mechanical features, operating principles, installation and maintenance of reciprocating, rotary, centrifugal, axial flow and hydraulic compressors. The function of compressor parts and accessories including control equipment are thoroughly discussed. A timely explanation of combining the modern gas turbine and axial flow compressor to develop a primary power unit is also included. A simplified presentation of the theory of compressing air is covered in one chapter. The many illustrations will assist the reader to clearly understand the mechanical features of actual compressors and the charts and tables will aid in solving compressed air problems.

The author has avoided much of the difficult mathematical treatise but presents the material in a manner such that the layman as well as the engineer can readily understand the operation of the several types of air compressors.—J. P.

LETTERS

Dear Mr. Cyr:

I just read the article what you wrote in the ELECTRICAL WEST magazine about how you and the government is gona install new kitchens for us folks.

Mr. Cyr, even if you are a Republican you is a smart man. I want one of the kitchens what you have got installed in my house right away after the war. It is good to know that there ain't no red tape about it and that you don't have to fuss around with a lot of guys runnin' in and out doing funny business putting wire in pipes just so that they can charge you more money.

The kitchen what we has got now is just ordinary so you know how to fix it so I can sit down and cook and do the house keepin' for the old man and our three kids what is home since Bill and Joe was taken to the Army. Guess it was an oversight you didn't put no lightin' in so if you can send some of those pipes what gives that light I read about in one of the advertisements in your magazine.

Now Mr. Cyr, I know this is all free between you and the New Deal—Bless them—but I ain't gonna feel right about not paying nothin cause I have been gettin a dollar now and then out of the old man's pants at night and I got it tucked away until there is almost a hundred dollars. When you bring it, I will give it to you so you can have it personal like as I understand the New Deal wants everybody to be happy and I feel you would be happy with a hundred dollars cause nobody ain't gonna pay you to write an article like you writ cause you air doing too good a work. Anyway, you can hurry the kitchen faster that way.

MRS. H. K. LOWELL

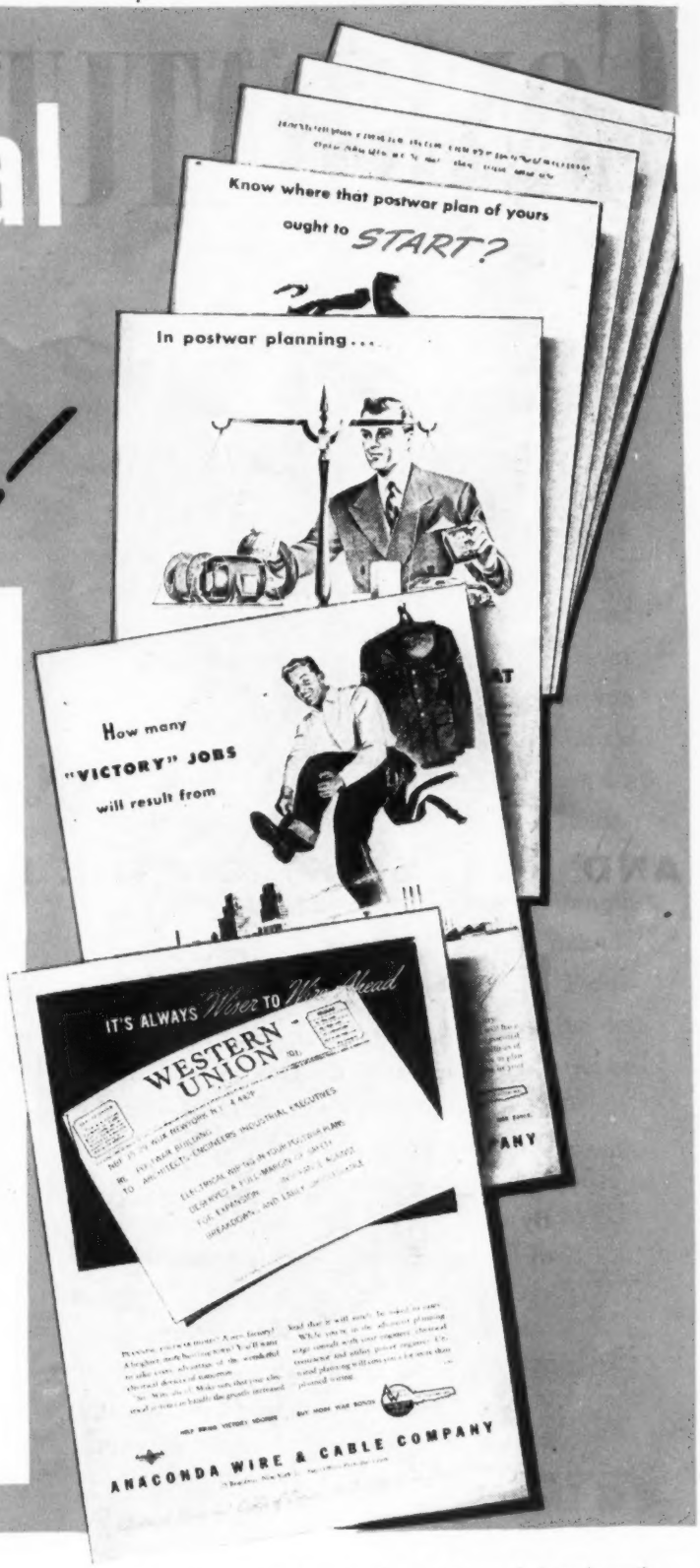
Fresno, Calif.

Electrical Wiring *comes first!*

Every electrical utility will benefit from Anaconda's national advertising campaign

ANACONDA's advertising campaign is aimed at creating a sounder basis for your postwar business. It urges postwar planners to allow extra capacity in wiring plans. It puts the spotlight on the big increase in the demand for power and equipment sure to come.

Don't overlook the opportunity to tie in with this special campaign. Plan now to get a maximum share of its benefits. Link your own promotion to your local adequate wiring bureau activities and Anaconda's basic advertising theme: It's always wiser to Wire Ahead! 44283


Know where that postwar plan of yours ought to START?
In postwar planning...
How many "VICTORY" JOBS will result from
IT'S ALWAYS Wiser TO Wire Ahead
WESTERN UNION
ANACONDA WIRE & CABLE COMPANY

BUY MORE WAR BONDS

• Full pages like these, in color, appear regularly each month in Time, Newsweek, Business Week and leading industrial publications read by America's foremost postwar planners.

ANACONDA

ANACONDA WIRE & CABLE COMPANY

25 Broadway, New York 4 . . . Sales Offices in Principal Cities

Electrical Wires and Cables of Copper are the Life Lines of our Nation

CONGRATULATIONS...

ON BOTH YOUR FINE WORK AND FORESIGHT ON THE PAYROLL SAVINGS PLAN!

IN your wholehearted support of the Payroll Savings Plan, you are doing far more than backing the most valid system of war financing—and building a powerful dam against the onrush of dangerous inflationary dollars.

By encouraging the all-out participation of your employees in this greatest of all savings plans, you are helping to create a sound economy for post war days.

With this same plan, you are assisting working America to build a mainstay against the inroads of unemployment and want—to save for homes, educational advantages and old age comforts!

You and your employees, through *mutual* cooperation in this forward-looking plan, are gaining a new and closer understanding—the cornerstone of a firmer, *mutually* profitable relationship!

National benefits, too, follow the "All Out" effort you are making! The prosperity of our United States rests on the economic stability of both management and labor. Your Payroll Savings Plan is working constructively toward the assurance of both!

The Treasury Department acknowledges with appreciation the publication of this message by

ELECTRICAL WEST

★ *This is an official U. S. Treasury advertisement prepared under the auspices of Treasury Department and War Advertising Council* ★

—from the COMPLETE LINE OF

OLIVER

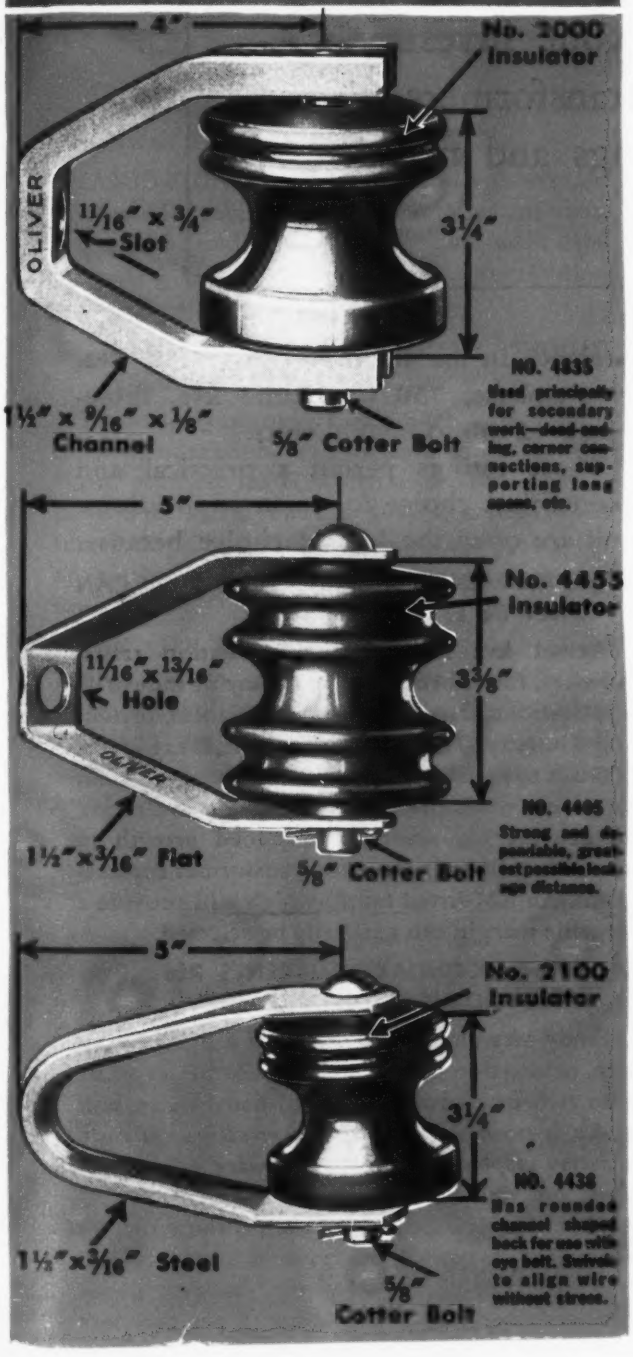
POLE LINE MATERIALS

Clevises

FOR ALL TYPES OF CONSTRUCTION

MECHANICALLY *Strong*
ELECTRICALLY *Efficient*

TYPICAL OLIVER DESIGNS



You have found that the right clevis at the right time makes a neater, better, faster job of erection. Realizing that utility men need a variety of styles of clevises, Oliver has developed a complete line. Are you familiar with them? You will find styles for every type of application—every one designed, built and *service tested* under operating conditions.

They combine great mechanical strength with high electrical efficiency to provide long life and satisfactory service. Porcelain insulators are carefully selected for the job. Metal parts are made from open hearth steel, hot-dip galvanized.

It will pay you to become familiar with these important *economy aids* now!

All Oliver Clevises are described fully in Catalog 43, which covers the complete line of Oliver Pole Line Materials.

OLIVER
IRON AND STEEL
Corporation

SOUTH TENTH AND MURIEL STREETS
PITTSBURGH 3, PA.

Repetitive-Manufacture

A discussion of advantages from

You can reduce your investment costs by specifying transformers with RM-listed kva ratings and utilizing their "loadability."

THE custom of specifying a transformer kva rating to match an "exactly" calculated load arose from a natural desire for economy. But as a result, transformers have been built in almost every intermediate step from 667 through 10,000 kva, requiring special treatment in design and manufacture that added to the cost.

How often was the "exact" kva rating needed really known or even accurately calculable? The general manager of an Iowa power company writes:

"In looking over our experience during the past years, I can readily see where, in practically all cases, we could have adapted our requirements to enable us to use a standardized product."

By ordering from a range of carefully selected, *listed* ratings, you gain all the benefits that can be realized through repetitive manufacture, such as lower prices, quicker shipment, simplified purchasing, and an improved product.

The kva ratings selected for General Electric RM-listed power transformers conform to those listed as "preferred" by ASA for step-down service: sizes chosen as the result of many years' operating experience in the range 667 to 5000 kva, single-phase; 750 to 10,000 kva, three-phase—2400 to 66,000 volts.

These ratings permit a practical and economical choice for most applications, and are often the logical choice because:

1. KVA LOADING AND LOAD GROWTH CAN ONLY BE ESTIMATED.

Actual kva loadings on substation transformers, for either power-company or industrial applications, depend on many variables, including diversity. These variables make it extremely difficult to figure the load very accurately. Also, it is usually desirable when selecting a kva rating to provide for several years' load growth in order to avoid too frequent transformer replacement. An RM-listed rating which will provide a suitable margin can generally be selected.

2. HIGH SECONDARY CURRENTS RESULT IN UNECONOMICAL DISTRIBUTION.

Study may show that choice of a higher voltage, or division of the total transformer capacity into two or more smaller RM-listed units, will make it possible *to save on over-all system costs, conserve copper, reduce circuit-breaker interrupting duty, and provide better voltage conditions.*

EXAMPLE A: Economic studies show that, at 480 volts, a typical distribution system which utilizes three-phase RM-listed power transformers rated 750 kva will be 25 per cent less costly than a comparable system in which the

Power Transformers

*the standpoint of KVA RATING**

required transformer capacity is installed in units rated 3000 kva or larger.

EXAMPLE B: Similar studies have revealed savings of as much as 50 per cent in system costs, when RM-listed power transformers were used with 480 volts as the secondary distribution voltage, instead of 240 volts.

3. TRANSFORMER "LOADABILITY" SHOULD BE CONSIDERED.

The ASA recognizes that, under many conditions of operation, transformers can carry, for short periods, loads which exceed the nameplate kva rating. Thus, a 5000-kva self-cooled transformer, initially carrying no load, can carry an emergency overload of 7500 kva for two hours.

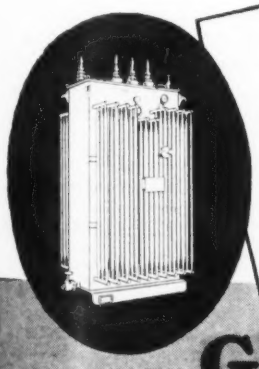
The AIEE indicates somewhat larger emergency loadings, with only moderate sacrifice in transformer life expectancy. Thus, the same 5000-kva transformer, initially carrying full load, on this basis could carry an emergency overload of 8500 kva for two hours.

Such transformer "loadability" should be carefully considered before kva ratings other than RM-listed ratings are specified. If short-duration peak loads are the main reason for the "special" rating, study of the loadability curves of standard units may show that an RM-listed rating slightly lower than that of the "special" will be suitable for the job, and that a considerable saving in cost can be made.

4. FORCED-AIR COOLING GIVES FLEXIBILITY TO NAMEPLATE RATING.

The forced-air-cooled kva rating of RM-listed transformers is either 25 or 33⅓ per cent more than the self-cooled rating, depending upon size; yet winding temperatures (average and hotspot) are within ASA limits. Forced-air cooling affords an attractive means for handling repeated or frequent peak loads or seasonal overloads, even though the higher losses and greater voltage drop that occur at the increased rating may tend to make its use undesirable for continuous forced-cooled operation. Properly applied, forced-air cooling can save unnecessary investment.

*This is the first in a series of messages designed to help you select and apply RM-listed power transformers—to help you gain the maximum benefit from them. Ask for Booklet GEA-4283 for complete descriptive information on RM-listed G-E power transformers, and Booklet GEA-4338 for additional data on how to select and apply these transformers. *General Electric Company, Schenectady 5, N. Y.*



RM-listed power transformers and unit substations are the result of repetitive manufacture of standard designs. Many of the parts used are manufactured in large quantities and carried in stock. The benefits to you: Quicker shipment (about 33 per cent less time), lower cost (6 per cent less), and simplified purchasing.

Buy all the BONDS you can—
and keep all you buy

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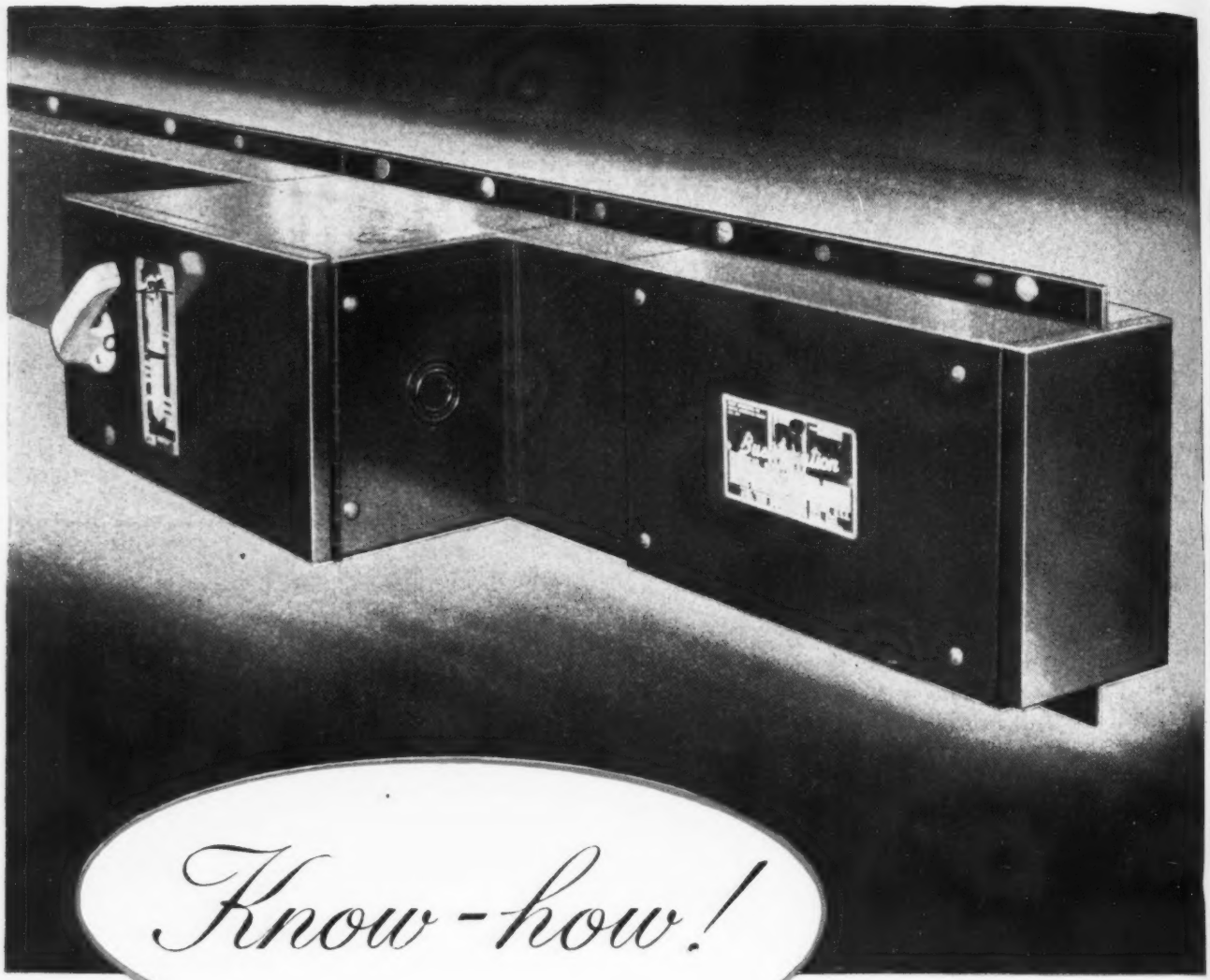

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MANUFACTURERS, large and small, turn to BullDog for the real "know-how" in electrical distribution.

This is only natural, for BullDog pioneered plug-in power and lighting systems, and has introduced every important new improvement.

Three modern BullDog DUCT systems, the most widely used in industry, provide complete versatility and flexibility of power and light for every type of industrial application.

BUStribution DUCT (illustrated above) for plug-in power at any point—Industrial Trol-E-Duct for portable tools, cranes, hoists and other "moving loads"—Universal Trol-E-Duct for completely flexible lighting.

For quality as well as "know-how," BullDog has enjoyed a reputation of leadership for nearly half a century.

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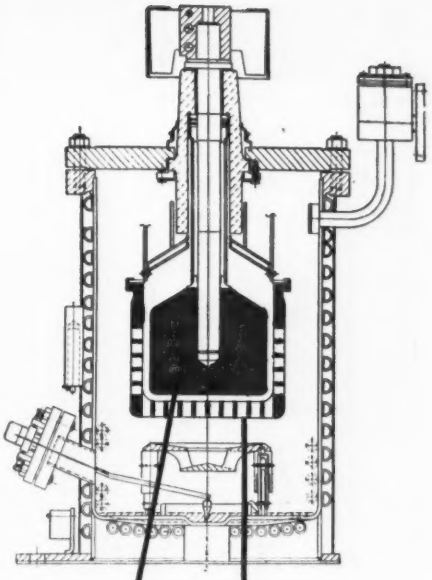
"Unless you can express it as a *Number*

you have no information"



THAT'S AN UNWRITTEN LAW in many laboratories today. Because "National" graphite's purity—99.979%—could be expressed as a number, the manufacturer's engineers knew what its performance characteristics would be when used as the anode and anode shield material in this Ignitron Rectifier.

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● We have been helping them learn to shoot with Railley-made Fuzes and Practice Cartridges. We've been helping them blast a path on enemy beaches with Railley-made Rocket Propulsion Units. We've been helping to protect them from the threat of poison gas with Railley-made Cellophane Gas Capes. We've been helping them receive quick medical aid through our work on the Field X-Ray Units. And now, in addition to all these tools of war, we're building thousands of reading lamps for the hospital beds of those whose luck ran out. May they find, under these lamps, not only entertainment and peace of mind and instruction . . . but may they also find the health and strength and vigor they spent so prodigally in our behalf.

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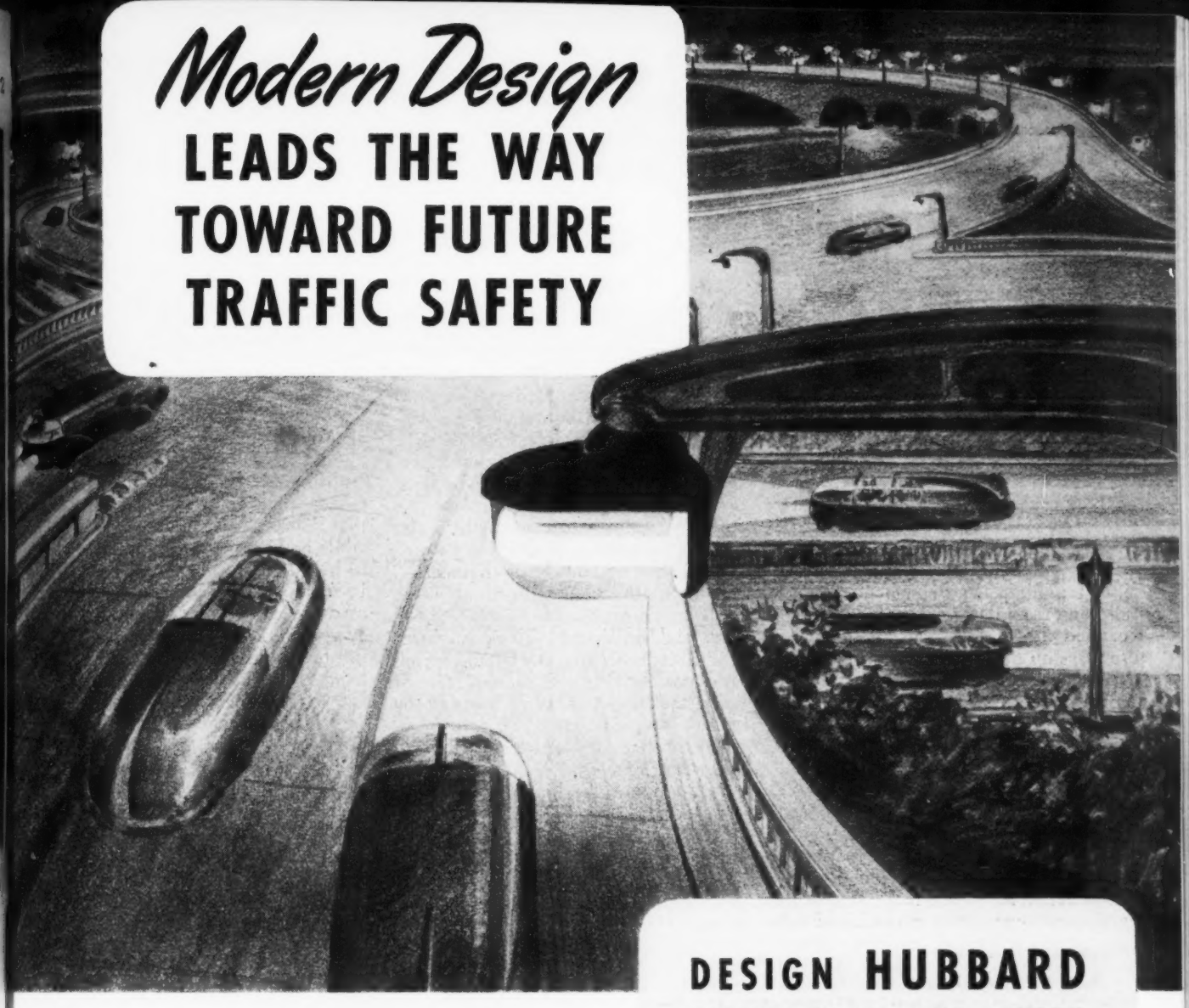

DESIGN HUBBARD TROLLEY MAST ARMS INTO YOUR STREET AND HIGHWAY LIGHTING PLANS

IN tomorrow's proposed plans for super-highway construction, safety will be of paramount importance. Projected detail drawings therefore indicate primary emphasis on the functional with due attention placed on architectural appearance, in keeping with the tempo of modern design. To realize the total fulfillment of the basic underlying objective which is the reduction of traffic hazards, accidents and tragic fatalities to a minimum, busy thoroughfares must be provided with proper and adequate lighting. After sundown lives depend on lights—lights depend upon modernly designed *Hubbard Trolley Mast Arms.*

Hubbard Trolley Mast Arms (patented) embody many exclusive and advanced features. Operation is effected by means of an endless pre-stretched bronze chain protectively encased in 12 gauge steel arm housing. Chain tension is adjusted by rod and thumb screw. Available in 6 ft., 8 ft., 10 ft., 12 ft., 14 ft., and 16 ft., lengths. Though architectural design and appearance of Mast Arms may change, the functional design of Hubbard Trolley Mast Arms will remain constant. When considering Mast Arms call us for complete details.

Hubbard and COMPANY

OAKLAND, CAL. PITTSBURGH CHICAGO

HANG THE LOAD ON HUBBARD HARDWARE

ELECTRA'S HUSBAND

And After Perpetual Motion?

JUST where and how Electra gets some of her stories is a puzzle. A few nights ago she handed me a clipping from the *New York Sun* which carried the heading, *REA Hired Men to Develop Perpetual Motion.*

"People here in the West develop some of the screwiest ideas," she said. By way of proving her point, the context of the newspaper story as reported by the *Sun's* Washington Bureau follows:

"Undismayed by the immutable laws of physics and unperturbed by the anguished cries of the nation's distressed taxpayers, the Rural Electrification Administration hired one religious fanatic and one ex-convict at a combined salary of $45 a day to invent 'perpetual motion devices,' Representative Charles Halleck (R.-Ind.) charged today.

"'WE'VE seen adagio dancers hired by the government to run our planned economy,' bewailed Mr. Halleck. 'We've hired fan dancers to amuse the frightened citizenry huddled in our air-raid shelters. We tried to harness the moon with the tidal dams of Passamaquoddy. But, even to Congressmen grown dizzy from following the fabulous acrobatics of our bureaucratic wizards, the revelations contained in Part IV of the Senate hearings for investigating the Rural Electrification Administration will prove almost too much to believe.'

"From the source mentioned Representative Halleck cites the testimony of V. A. Young, supervising investigator of Agriculture, who discovered in 'a large file of similar projects' no fewer than two cases in which the REA planners spent government funds in an attempt to add perpetual motion to the aimless gyrations of those who populate the teeming banks of the Potomac here in Washington.

"According to these hearings—and Representative Halleck carefully refers to pages 1344 and 1345—the REA, at the suggestion of some of its employees, hired a resident of Utah at a per diem pay of $25, and provided him with expensive laboratory equipment to develop a 'perpetual motion' device that would 'siphon electricity or radiant energy out of the atmosphere so that light could be produced in ordinary bulbs, various apparatus could be heated, and airplane motors or anything else could be operated solely with its power.'

"The REA had one of its engineers—Mr. Franklin P. Wood—observe the Utah man's experiments in Salt Lake City, and, in August 1939, Engineer Wood made his report. Of the inventor's process, Mr. Wood said that it was a challenge to aid in 'changing the present stupid system of individual profit production to one which will usher in a new era.'

"Of the inventor himself Mr. Wood reported:

"'He is unfathomable. He is an unmitigated ass, crackpot, nitwit, religious fanatic, essentially honest, unable to originate or perpetuate a hoax or fraud. In some inexplicable way he has, I believe, stumbled onto something that he himself cannot understand, but which, if it is all he thinks it is, will more profoundly affect the human race than any discovery in previous history. He is stubborn beyond reason and believes that it is a revelation from Heaven and that in the Lord's own time, which may be any time now, the Lord will tell him how to bring it out. . . .'

"While waiting for the divine revelation, the REA kept the man on the pay roll at the $25-a-day figure for a year and a half, until Feb. 28, 1941.

"Then, early in 1940, the REA hired another man to perform a little chemical magic that would, in Engineer Wood's opinion, 'mean the elimination of all coal mining and much of the oil production, the stopping of all water-power development and the changing of the metal products industries,' thereby ushering in 'an era of complete abundance.'

"Representative Halleck's summary of the committee hearings does not go fully into the subject of this second man's academic background, but it does show that he was an alumnus of the Washington State Reformatory, the Michigan State Prison, the Michigan State House of Correction, the Calgary City Jail, and the Duluth County Jail. Just six months prior to his employment by the REA, this scientist completed an eight-year post-graduate course in Folsom Prison, Calif.

"His record in these institutions indicates a broad and varied knowledge in such fields as forgery, armed robbery, uttering false and forged checks, vagrancy and 'open drunkenness'—which in Duluth is presumably a less heinous offense than open-and-shut drunkenness. His visit to Folsom was occasioned by his possession of counterfeit dies and plates, and a bad habit he had of printing phony travelers' checks which he cashed to the tune of about $75,000, the report discloses.

"It should be clearly understood, of course, that it was not for these talents that the REA paid the man $20 a day while he worked. They were interested in his ability to decompose water into its component elements of hydrogen and oxygen—which is a common everyday occurrence in laboratories; but to which he claimed to be able to bring a new and interesting twist. He showed Mr. Wood in what was described as a 'convincing' demonstration that he could do this by a process that used so little electricity that the energy of the hydrogen thus released would be from five to ten times the original electric power employed.

"If his claims were correct, it would appear that a small battery and a tank full of water were the only ingredients necessary to run any machine on, under or over the surface of the earth. The battery would start the decomposition of the water, and thereafter the hydrogen released would provide the necessary energy to keep the engine running as long as a supply of water was available for fuel.

"Unfortunately for the inventor, however, a Mr. Felix Frazer, assigned to assist him in his experiments, persuaded two professors from the California Institute of Technology to drop in and give the process the once over. They did so—lightly. They did not find his tests 'convincing' at all; and they pointed out quite rudely that what he proposed was 'perpetual motion,' and that a 'successful demonstration of his process would invalidate and overturn some of the most fundamental and thoroughly tested principles of physical science.'

"Nevertheless, the term which this second scientist served with the REA lasted a year, a month and a day."

Things like this are hard to take and hard to understand. Two or three days after I read it, the Administration announced the appointment of Aubrey Williams as director of the REA. Contemplation of his qualifications for this particular job makes one wonder what will come after perpetual motion.

CHECK on this "QUICK-CHECK" Feature of the Solar Capacitor Analyzer . . .

THE SOLAR MODEL CE Capacitor Exam-eter speedily locates common defects in capacitors without disconnecting condensers—often eliminating further tests. This saving of time and labor is accomplished by the unique Solar "QUICK-CHECK" feature.

In this *single* instrument are combined the simplest, most convenient methods for examining the true condition of every capacitor in ordinary use . . . shorts, opens, intermittents, high R.F. impedance and high power factor.

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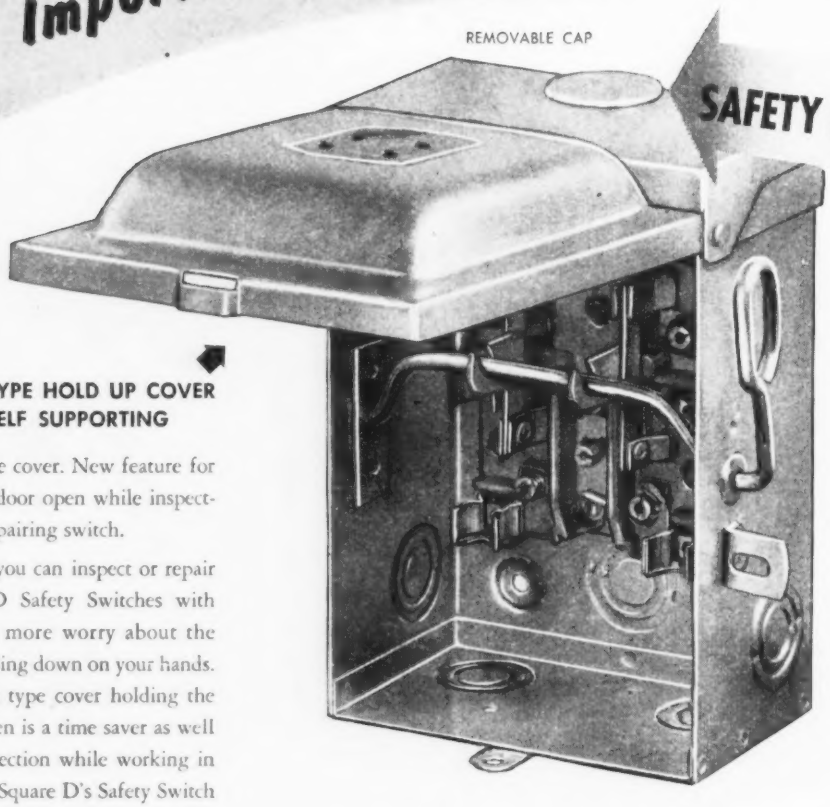
Important Addition TO SQUARE D RAIN-TIGHT SAFETY SWITCH ENCLOSURES



LOCK TYPE HOLD UP COVER —SELF SUPPORTING

Lock type cover. New feature for holding door open while inspecting or repairing switch.

Now you can inspect or repair Square D Safety Switches with ease, no more worry about the cover falling down on your hands. The lock type cover holding the cover open is a time saver as well as a protection while working in the rain. Square D's Safety Switch Enclosures are galvanized steel and aluminum finish.

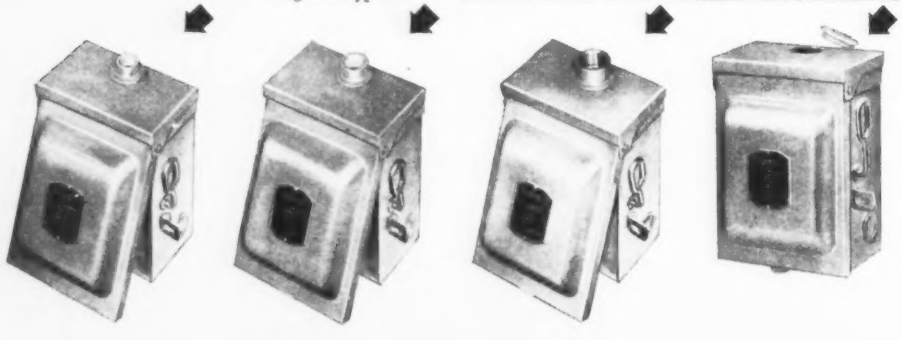
TYPE R–Rain tight switch. 250 to 575 volts—30 to 200 amperes.

The type R rain-tight safety switch is not provided with opening for the interchangeable type hubs.

TYPE RO—The type RO Rain-Tight Safety Switch is provided with the thread in the top endwall of the enclosure for the interchangeable hub as shown in the schedule below. 250 to 575 volts—30 to 200 amperes.

The thread in the endwall of this enclosure will not fit standard pipe fittings. Select the necessary fittings for this switch from the catalog numbers below and order from your electrical wholesaler.

Switch Rating	Plug Adapter bushing for Conduit Size					
	Only	¾"	1"	1¼"	1½"	2"
30 Amps	A1	C1	D1	—	—	—
60 Amps	A2	C2	D2	E2	—	—
100 Amps	A3	C3	D3	E3	G3	—
200 Amps	—	—	D4	E4	G4	H4



Five Interchangeable Hubs *All Adaptable To Type Ro. Type C And Type D Enclosures*

You can now use Square D's rain-tight Safety Switch Enclosure with the interchangeable hubs. Five different adapter bushings to fit five different conduit sizes. All are interchangeable and are adaptable to the same switch enclosure.

These switches will be provided with one threaded opening in the top endwall of the box. This thread will not be standard—consequently, adapter bushings and plugs will be provided and sold as separate items. It is important to know that the thread in the box endwall will *not* take standard pipe fittings, otherwise you may learn this fact to your inconvenience after you are on the job and ready to connect the conduit.

All switches requiring the use of adapter hubs should be ordered with the suffix RO. The catalog numbers will apply for the adapter bushings for conduit and for hole closing plugs:

Type C Rain-Tight Safety Switches are quick make and quick break. Made up to and including 600 amperes, 600 volt. Fusible and not fusible. Horsepower rated. 2, 3 and 4 poles, 2, 3 and 4-wire solid neutral.

Type D Rain-Tight Safety switches are quick break only in capacities from 60 to 600 amperes inclusive. Thirty-ampere switches are not quick break. Made with 2, 3 and 4 pole and 2, 3 and 4-wire solid neutral 230 volt A.C. and 250 volt D.C.

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ELECTRICAL WEST

FEBRUARY, 1945
VOL. 94 NO. 2

FOURTH YEAR OF WAR

Photo by U. S. Army Signal Corps

AMERICA got drunk toward the end of 1944—drunk with overconfidence, with complacency, with roseate dreams. "All out for war—what the hell? The war's won; let's get ready for the future," people began thinking and saying. Then von Rundstedt and his crazed Krauts turned the tables and sobriety and penitence and determination returned to a chastened people.

Paradoxically this story is told in the behavior of the curve of electric power output, just as it is told in divers of other industrial figures. Energy production reached record peaks toward the end of 1943 and this rate carried over into the early months of 1944 as the whole nation worked to meet the emergency demands of total war. Then the optimists took over. The end of the European phase of the war was in sight. Surpluses began to build up and production eased off. Quickly the figures on weekly power output reflected this change, sagged and soon were lower than for the similar period in 1943. Here in the Far West this trend was particularly noticeable, because so much of the electric power was being used for the production of vital war materials such as aluminum and magnesium. At times power use was as much as 15% behind 1943.

The fact that the full resources of the electrical industry were not utilized in the war effort accounts for the moderate increase of only 7.5% in the amount of power generated here in the West in 1944 as compared with 1943. The previous year's differential had been 24%.

But the tide turned late in December when an attitude of realism replaced the dejection caused by momentary Axis victories. Everywhere industry stepped up production and demands for power shot ahead. By the first weeks in January power output had recrossed the 1944 line and was slanting upward. And it should continue that way until final victory is assured.

Here in the Far West, the warborn trends that became so evident in 1943 continued to affect the industry. More and more work was done with less and less people. Streamlining of operations and practices increased. A more full realization of the hazards and opportunities of the new Western industrial resurgence was developing.

The degree to which war shuffles all of the cards of business and industry became apparent. Diversion of standard materials and parts continued and the necessity for substitutes intensified. Supply lines have been shuffled around. Shortages and emergencies developed on new fronts, requiring new ingenuity and enterprise—attributes for which the electrical industry is noted. Everywhere prewar customers were lost and new ones gained, with consequent concern about postwar alliances. Within the industry itself the war-created spirit of solidarity and cooperation continued to grow.

A year ago we unrealistically predicted that 1944 would bring V-E day. In the face of that mistake, we can say now that in 1945 the time of war should run out—for the Nazis certainly; for the Japs possibly. Even so, until war's urgent demands are met fully and completely, there can be no diminution in the production of anything needed by our fighting forces. Until the last knockout blow, it is our job here at home to continue backing our armed forces to the limit of our capabilities. 1945 started out as a year of reprieve; we can hope that it will close as a year of victory.

Table I—Comparison of National to Western Operations for 1943 and 1944

	11 Western States		United States		Percent West to U.S.	
	1943	1944	1943	1944	1943	1944
Energy generated (Millions of Kwh.)†	41,163	44,261	220,969	227,867	18.6	19.4
Energy generated in Hydro Plants (Millions of Kwh.)†	35,015	37,023	73,942	73,090	42.4	50.6
Energy generated in Fuel Plants (Millions of Kwh.)†	6,147	7,227	147,027	154,778	4.2	4.7
Percentage of Hydro to Total Generated	85.2	83.6	33.4	32.1	...	...
Installed Generator Capacity (Kw)†	8,346,520	8,776,104	49,304,553	50,244,703	16.9	17.5
Installed Hydro Generator Capacity (Kw.)†	5,855,717	6,318,092	14,066,970	14,579,970	41.6	43.4
Installed Fuel Generator Capacity (Kw.)†	2,480,803	2,457,912	35,237,583	35,664,733	7.0	6.9
Revenue from Energy Sales (Thousands of Dollars)†	379,000	418,000	2,816,000	2,926,000	13.5	14.2

† Source—Federal Power Commission. ‡ Data from EET.

Table II—Ten-Year Generation Record for Western Public Utilities

(Thousands of Kilowatt-hours)

	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944*
Arizona	344,939	377,797	510,483	717,825	696,787	1,327,485	1,404,299	1,459,689	2,630,936	3,198,771	3,747,273
California	561,951	9,060,296	10,091,716	9,632,178	9,426,519	9,403,588	9,788,869	10,383,352	11,583,154	14,776,371	15,958,664
Colorado	506,710	549,157	652,404	721,482	731,395	760,445	791,967	818,213	977,690	1,097,260	1,083,666
Idaho	685,089	672,466	796,430	972,212	992,278	1,126,518	1,175,305	1,142,341	1,244,946	1,338,183	1,256,541
Montana	867,504	1,296,199	1,452,390	1,319,637	1,324,151	1,575,016	1,769,124	2,177,623	2,248,133	2,597,086	2,477,463
Nevada	32,152	27,719	171,499	1,152,788	1,491,205	1,855,042	2,324,176	2,403,747	2,432,124	3,228,132	3,329,478
New Mexico	173,229	190,744	214,602	255,378	262,124	281,508	316,862	368,449	409,854	470,931	507,489
Oregon	1,002,338	1,083,818	1,250,421	1,392,177	1,253,615	1,484,468	1,739,903	2,909,772	3,651,159	4,619,280	4,831,000
Utah	206,706	309,835	418,194	507,415	340,172	425,474	577,641	564,812	604,393	619,280	460,112
Washington	2,747,366	2,981,621	3,273,148	3,734,715	3,400,683	3,642,610	3,944,184	4,499,031	6,494,920	8,926,679	10,343,262
Wyoming	81,856	93,779	114,755	131,139	139,205	141,135	184,701	217,343	243,697	290,538	255,671

*F P C reports for 12 months ending November.

Table III—Number of Utility Customers at End of 1944*

Class of Customer	11 Western States 1943	11 Western States 1944	11 Western States Change	United States 1943	United States 1944	United States Change
Residential	3,465,791	3,511,000	45,309	26,872,639	27,360,000	487,361
Rural†	337,691	363,000	25,309	1,088,698	1,150,000	61,302
Commercial and Industrial	618,682	642,000	23,318	4,314,838	4,403,000	88,162
Municipal, Railway and Miscellaneous	19,777	19,500	—277	120,125	117,000	—3,125
Total	4,441,841	4,535,500	93,659	32,396,300	33,030,000	633,700

* 1944 Estimated. † Customers served on specific rural rates. Rural customers served on urban rates not included.

Table IV—Type and Capacity of Utility Generators, November, 1944

State	Companies*	Plants	Total Capacity Kw.	Generator Capacity In Kilowatts of Plants Operated by (a)—Water Power No.	Water Power Capacity	Steam Power No.	Steam Power Capacity	Internal Comb. Engines No.	Internal Comb. Engines Capacity
Arizona	20	52	671,524	15	540,790	10	87,175	27	43,559
California	31	160	3,394,522	119	1,982,515	26	1,363,100	16	48,907
Colorado	40	86	352,458	30	87,985	26	247,719	30	16,754
Idaho	17	60	268,050	46	264,065	1	400	13	3,593
Montana	22	41	373,384	22	358,273	4	11,968	15	3,143
Nevada	8	15	589,777	10	586,135	..	....	5	3,642
New Mexico	22	45	149,364	5	25,157	13	103,091	27	21,116
Oregon	24	71	901,779	50	712,267	12	184,550	9	4,692
Utah	28	77	168,897	59	92,185	3	66,250	15	10,462
Washington	24	62	1,823,725	45	1,619,380	10	202,320	7	2,025
Wyoming	31	50	82,616	14	49,440	11	27,537	25	5,639
11 Western States	267	719	8,776,104	415	6,318,092	116	2,294,110	188	163,802
United States	1,705	3,965	50,244,703	1,515	14,579,970	1,107	34,602,088	1,343	1,062,645

(a) For combination plants each type of prime mover is counted as a separate plant.
* Includes duplications because of utilities operating in more than one state.
Source: Federal Power Commission.

Table V—Distribution of Government War Contracts, June, 1940—October, November, 1944
(All Figures Millions of Dollars)

State*	Net Total (1)	Supply Contracts Through November, '44 (2) Total	Aircraft	Ships	Ordnance	All Other	Facility Projects Through Oct.,'44 (3) Total	Industrial	Military	Total Plus Project Orders (4)
Arizona	321	91	59	1	3	28	230	97	133	321
California	18,689	16,410	9,890	4,431	476	1,614	2,278	1,007	1,271	19,670
Colorado	771	468	2	4	365	97	304	134	170	771
Idaho	135	17	†	1	10	6	119	20	99	135
Montana	75	21	†	..	7	14	54	13	41	75
Nevada	254	34	†	*	*	34	220	143	77	255
New Mexico	118	12	†	†	3	9	105	8	97	118
Oregon	1,709	1,453	1	1,289	21	142	256	98	158	1,709
Utah	606	177	1	*	153	23	430	279	151	645
Washington	5,030	4,376	1,886	2,038	136	316	654	336	318	5,728
Wyoming	99	52	13	*	†	39	47	24	23	99
11 Western States	27,807	23,112	11,852	7,765	1,173	2,322	4,697	2,159	2,538	29,526
United States	207,320	177,373	58,125	26,781	44,834	47,633	29,948	16,896	13,052	216,708

(1) Reflects all decreases due to contract cancellations and reductions.
(2) Individual contracts awarded by Army, Navy, Maritime Commission, Treasury Procurement Division and Foreign Purchasing Missions.
(3) Includes Army, Navy, Maritime Commission, Defense Plant Corp., Reconstruction Finance Corp., and British Empire Governments.
(4) Manufacturing project orders to Army and Navy establishments, to be subsequently awarded as prime contracts by such establishments.
* Less than $500,000
† Less than $50,000.

Production War's peak demands for electric power were met with a record output from Western generators—44,261 million kwh. in 1944, up 7.5% from 1943. Production was predominantly hydro, 83.5% coming from that source. More than half of all U. S. hydro power comes from Far Western plants.

Energy Use Like a big segment of the public and many industrial machines, power facilities did not work as hard for the war as they might have. Nationally the increased use in 1944 over 1943 was only 4.5%, here in the West, 7.5%. Average production per customer was 9,860 kwh., as compared with 9,675 kwh. in 1943. Nationally the figures were 6,940 kwh. for 1944 and 6,860 for 1943.

Capacity The Far West now has 17.5% of the nation's electric generating capacity. The total rose in 1944 to 8,776,104 kw., an increase of 430,000 kw. over the preceding year. All of the new capacity was in hydro stations and the increase in this region was half of all of the new facilities added in the whole U. S.

New Plants For the duration, at least, the West's generating plant is fully built. Only about 75,000 kw. are scheduled for completion in 1945 and 300,000 kw. for 1946 and later. However, almost 750,000 kw. of new facilities are in the planning stage.

Generators Reduced production from the West's high-load-factor light metal industries cut down the average work period of Western generators. In 1944 the average generator worked 5,160 hours as compared with 5,380 hours in 1943. As might be expected, hydro machines carried most of the load, averaging 6,065 hours of use.

Reserves Even though war demands quickened following the Nazi breakthrough, there is still an ample margin of electrical capacity in the Far West over and above foreseeable demands. FPC figures for December 1944 showed a 20% margin for the Pacific Southwest and an 18% margin for the Pacific Northwest. A year earlier the margins of capacity to demand had been 13% and 5%.

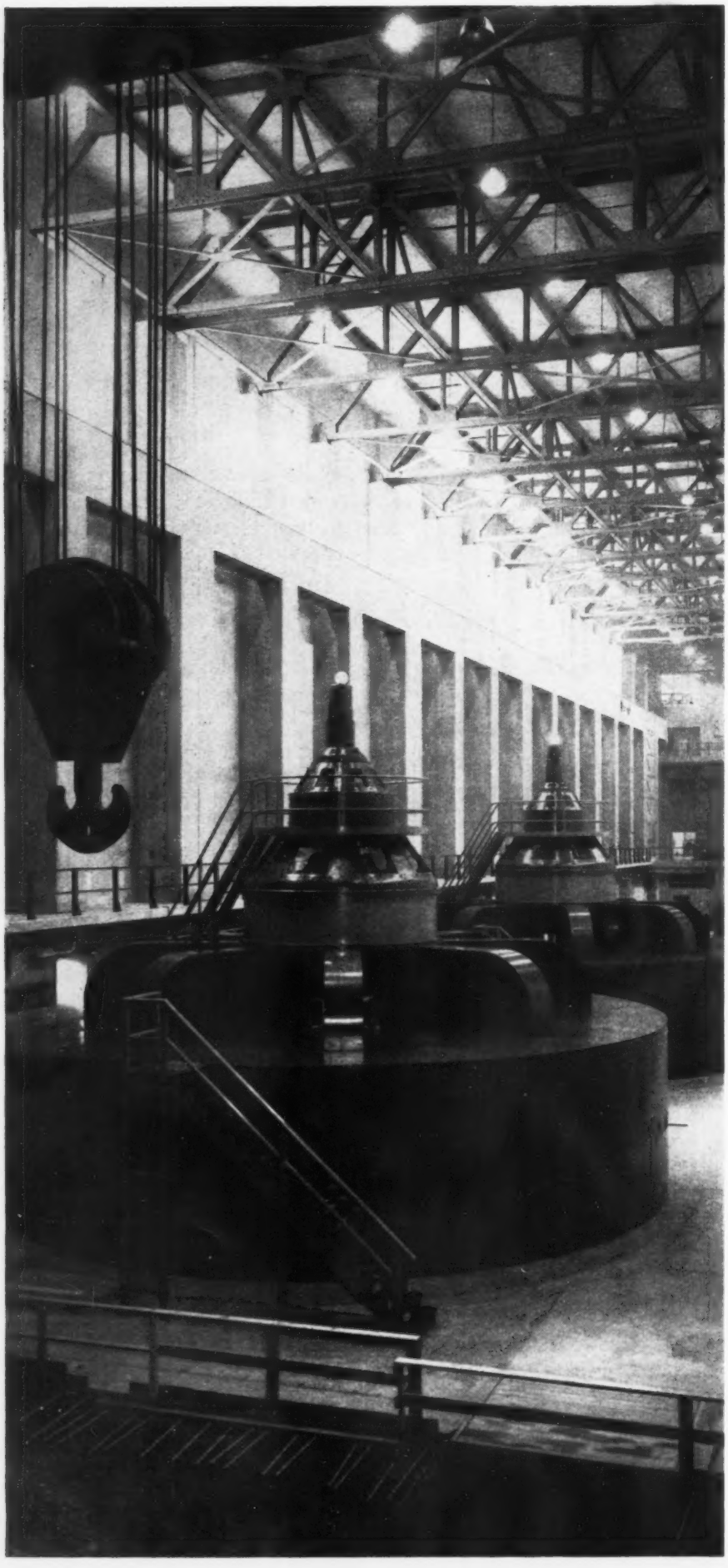
Expenditures Private and municipal utilities spent approximately $70,000,000 in the eleven Western states for new facilities in 1944. Additions to federal generating and transmission facilities required an amount almost as large.

Budgets Proposed expenditures for 1945 will depend upon the progress of the war and the availability of materials. Utilities in this region have budgeted a total of $116,723,000 and expenditures could exceed that. Federal power facilities will add an estimated $50,000,000. Maintenance expenditures will be $31,875,000.

Customers As populations of the Pacific Coast states swelled, the number of utility customers continued to grow. In 1944 the increase was almost 100,000, bringing the total for the eleven Western states up to 4,535,500. Of this number 3,511,000 are wired homes.

War Industry Some $27,807,000,000 of war contracts have been let in the Western states. California now leads all states with $18,689,000,000. The measure of western industrial expansion is seen in the $2,159,000,000 spent for new facilities.

Markets Accumulating demand for appliances is almost astronomical in number. Virtually all average kwh. domestic consumptions now top 1,000 and many are over 3,000. Anticipated are 4,000 and 5,000 after the new devices hit the market and selling begins.



WESTERN

PASSING of another war year finds the position of the electric power industry of the West little changed from that reported a year ago. As pointed out in that survey, there would be half or less as much generation added as during the record year of 1943, with its more than a million kilowatts of new capacity. Actually, total generation brought in during 1944, was 472,500 kw., all hydro. This was comprised of 150,000 kw. at Shasta Dam on the Central Valley Project; 140,000 kw. at Pit 5 of Pacific Gas and Electric Co.; an 82,500-kw. unit at Boulder and another 108,000-kw. machine at Grand Coulee. Planned for 1945, is only 110,000 kw., of which 90,000 kw. is hydro on Tacoma's Second Nisqually project, and 20,000 kw. in a second outdoor steam unit by the City of Glendale.

The year 1944 saw a sharp curtailment in the production of light metals in the West, with a drop in power demand of something like 400,000 kw. As against this, demands of other war industries continued to climb, and had absorbed about a third of the released capacity by the end of the year.

Several important high-voltage transmission lines were added to the Pacific Coast network during the year. Most notable was the 183-mile second Grand Coulee-Covington, 230-kv. wood pole line that provided for additional delivery to the Seattle-Tacoma area. Idaho Power Co. put into service a new 106-mile, 66-kv. line to serve a mining area, and 100 miles of 230-kv. line was built by the USBR to provide for delivery of Shasta Dam power to the PG and E system at Oroville, Calif.

Some new transmission substations were built and many distribution substations were required to meet additional demands. In the latter category, considerable activity is planned for 1945, contingent to a large extent upon

Two 75,000-kw. units at Shasta power house were placed in operation in July of last year. Three more similar units will complete the plant to 375,000 kw.

UTILITIES PLAN FOR 1945

Deferred Maintenance Mounts--Budgets Up

the availability of materials and labor.

Total budgets for this year are up from that of 1944, with a large proportion earmarked for distribution, both replacements and new. Continued war conditions pile deferred maintenance ever higher, with mounting reserve accruals commensurate. In fact, with prospects of the European war continuing well through 1945, deferred maintenance looms so large that it will constitute the major utility activity immediately upon availability of labor and materials. It is to be noted also, that rural extensions and rebuilding of distribution to serve higher load densities rank high in postwar expenditures planned.

In the following splendid reports provided ELECTRICAL WEST through the cooperation of executives and officials of private and municipal and governmental agencies there is every evidence of carefully studied post war planning. Until the day when these plans can be executed, the power industry of the West will still be in pitching—meeting every war demand.

Federal

Bureau of Reclamation

CURRENT appropriations and unexpended balances totaling approximately $79,700,000 are available for carrying forward the construction program of the Bureau of Reclamation during the fiscal year ending June 30, 1945. The sources and approximate amounts of these funds are as follows:

Appropriated by Congress from Reclamation Fund	$ 9,900,000
Appropriated by Congress from General Treasury	69,800,000
Total	$79,700,000

The present construction schedule is indefinite and depends upon war conditions. Work proposed for each project depends upon approval of priority applications submitted or to be submitted to the War Production Board. The principal work accomplished in the fiscal year 1944 and a statement of probable work for the fiscal year 1945, are briefly described for each project under the states in which the work is located. A tabulation of USBR current and future power development appears on page 85.

Bonneville

DETAILED activities of the Bonneville Power Administration are reported on page 84.

REA

THE principal development in rural electrification in the West during 1944 was the formulation of plans for extension of power distribution lines into unelectrified areas after the war. In a preliminary report to the U. S. Department of Agriculture committee on postwar programs, the REA postwar planning committee estimated that REA borrowers alone can extend service to 86,700 new rural consumers in the eleven states west of the 100° meridian, within three years after manpower and materials become available for large-scale rural power line construction.

This program would be contingent upon future authorizations by Congress of loan funds to REA. It would involve an expenditure of $48,805,000 to finance new distribution lines, generation and transmission facilities, improvement of existing rural electric systems, and the purchase by consumers of farm and home electric installations. The program is based on the assumption that rural electrification will be carried on as far as possible under an area coverage plan which will make service available to all rural establishments in given areas, without leaving unserved sections and farms stranded on the fringes.

Area coverage electrification by REA borrowers will be facilitated after the war, as a result of new federal legislation enacted during the year. The Pace Act reduces the interest rate on all REA loans to 2% and permits extension of the amortization period on loans from 25 years to 35 years, where necessary to provide complete electrification on a self-liquidating basis.

The REA three-year program for the eleven Western States is part of a proposed three-year national program of REA financing which would total $579,000,000. The three-year program, in turn, is part of a projected five-year program of rural electrification by all agencies, REA-financed and other. The REA postwar planning committee estimated that the five-year program would bring electric service to 3,655,000 unserved rural establishments and create a market for goods and services amounting to more than $5,500,000,000. In addition to more than one billion dollars for power lines, this estimate included amounts that would be expended for wiring, appliances and plumbing by consumers receiving service for the first time and by consumers already on existing rural electric lines.

In 1944, new construction by REA borrowers in the West was limited to line extensions from existing systems to connect farms qualifying for service under the War Production Board's wartime emergency service regulations.

Reports appear alphabetically under states:

Arizona 74
California 75
Colorado 82
Idaho 83
Montana 83
Nevada 83
New Mexico 84
Oregon 84
Utah 87
Washington 88

Photo sources: pp. 72, 78, USBR; p. 74, Central Arizona L&P; p. 79, PG and E; p. 81, Los Angeles Dept. of L&P; p. 83, Idaho Power and Washington Water Power; pp. 84, 88, Bonneville; p. 87, Army Air Corp; p. 89, City of Tacoma.

Three-year REA Postwar Program—Eleven Western States* (Tentative)

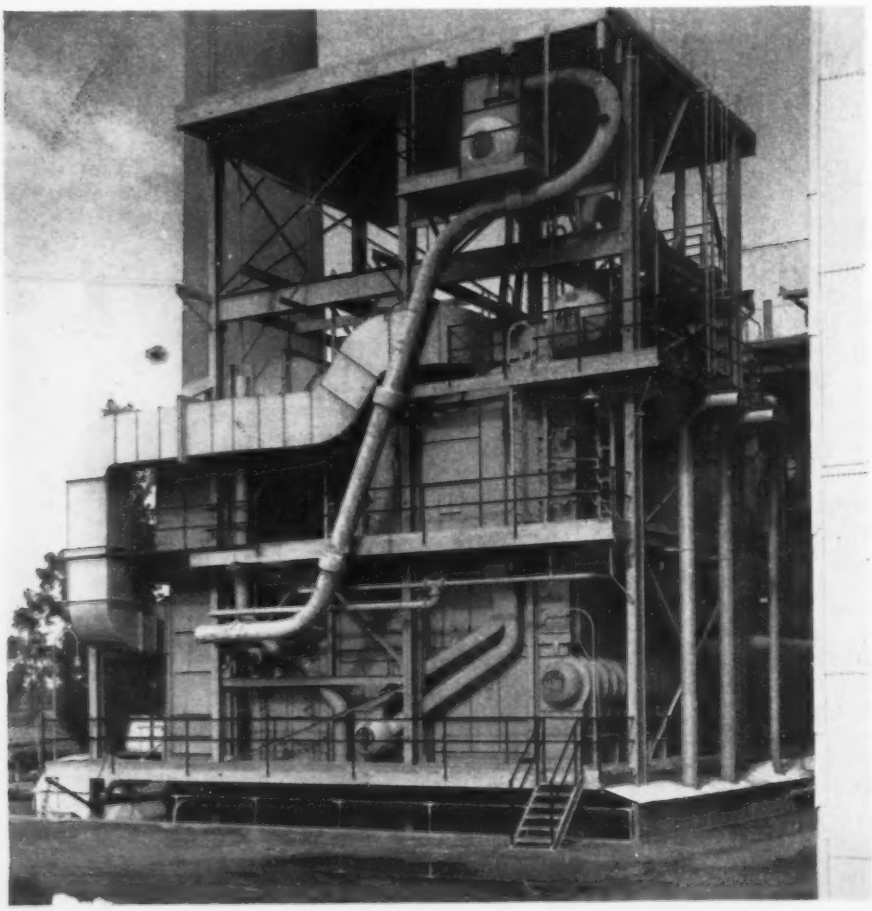
Area	Rural Customers to Receive Service	Total Man-Years of Labor Involved	Investment Required —For Program— Distribution Lines	Related Facilities**
Arizona	5,200	1,000	$2,000,000	$ 100,000
California	3,700	800	1,500,000	750,000
Colorado	15,000	3,000	6,000,000	3,400,000
Idaho	5,100	1,000	2,000,000	1,950,000
Montana	10,300	2,000	4,000,000	1,100,000
Nevada	500	100	200,000	55,000
New Mexico	8,200	1,500	3,000,000	1,150,000
Oregon	13,300	2,500	5,000,000	2,000,000
Utah	2,500	400	750,000	800,000
Washington	12,200	3,000	6,000,000	1,750,000
Wyoming	9,800	2,000	4,000,000	1,300,000
Total	86,700	17,300	$34,450,000	$14,355,000

* The three-year period after materials and manpower become available in quantities sufficient to permit general resumption of primary line construction. Construction costs are based on REA prewar experience.

** Loan funds to finance the improvement of existing rural electric systems, the construction of generation and transmission facilities, and the purchase by rural consumers of farm and home electric installations.

Since January 1943, WPB regulations have authorized the extension of service to farms able to use electrical equipment in livestock, dairy and poultry production. During the fiscal year ended June 30, 1944, there was a net increase of more than 10,000 in the number of farms connected to the lines of Western private utilities, REA-financed cooperatives, power districts and other public agencies. This brought the percentage of electrified farms up to 67.3 in the eleven Western states. An estimated 167,000 farms in this region still were without central station service.

Gross revenues of the REA borrowers in the eleven Western states amounted to $4,131,513 in the 1944 fiscal year, as compared with $3,435,615 in the preceding year. As of November 30, 1944, REA had allotted $44,818,777 as loans to finance the construction of specific rural electrification projects in these states. However, only $31,272,202 of this amount had been advanced as loans to borrowers, because wartime materials scarcities have curtailed rural power line construction sharply since the summer of 1941. Plans to speed up the letting of contracts for authorized projects for which $13,546,575 of allotted loans is still available to Western borrowers, were made at a meeting of REA officials and borrowers' representatives in Denver last September. The proposed three-year program does not include these projects, which will be resumed as soon as materials and manpower can be obtained.—*Current Information Section.*



Central Arizona Light & Power Co., solved a wartime equipment problem, when it purchased a dismantled boiler in Chicago, shipped it to Phoenix and erected it there to provide needed boiler capacity to serve new war load

Arizona

Arizona Power

TOTAL capital expenditures for electric department for eleven months ended November 30, 1944, were $35,874. This expenditure was mainly for renewals and replacements, though it did include a few short extensions for new business.

There was no generation capacity added and no new transmission lines. There were only minor additions to our distribution system.

We have $113,500 budgeted for capital expenditures in 1945, the major item being the replacing of an indoor type substation at our Childs hydro plant with an outdoor type and the rebuilding of our Bluebell line, an 11-kv line feeding a small mining district.

We contemplate no additions to our generating plants or transmission system for 1945.—*Malcolm B. Bridgwater, general superintendent.*

Central Arizona L. & P.

EXPENDITURES for additions to our electric property during 1944 amounted to approximately $290,000. Major items included the completion of a new boiler and spray pond at the steam electric station, $120,000; transmission line reconstruction and replacements, $10,000; 66-kv. and 12-kv. substations, $40,000; distribution lines and services, $30,000; 4-kv. to 6.9-kv. cutovers, $30,000; distribution transformers, $25,000; electric metering, $30,000. One 1,500-kva.,

12/4-kv. distribution substation was changed to 3,000-kva., 66/4-kv. and one 3,000-kva., 66/12-kv. transmission substation was changed to 4,500-kva., 66/12-kv. during the last year.

Our 1945 electric property budget is estimated to be approximately $285,000. Major items are as follows: 66-kv. transmission lines, substations, reconstruction and replacements, $90,000; additional distribution substations, $68,000; improvements and reconstruction of electric distribution system, and services, $82,000; distribution transformers, $20,000; and electric metering, $20,000.

Additions to three substations and the building of 13 miles of 66-kv. transmission line, and the converting of one existing 44-kv. transmission line to 66-kv. is the only construction contemplated for 1945 due to the still existing material and manpower shortage. A postwar construction and maintenance program is now being prepared.—*L. N. Doutrick, vice-president and chief engineer.*

Parker Dam

CONSTRUCTION of 140 miles of 161-kv. transmission line from Parker Dam to Phoenix, Arizona, including terminal facilities at Phoenix and Parker Dam is scheduled to start in January 1945, and is expected to be completed by July, 1945. Funds allotted for this project are $1,700,000.

Tucson G., E. L. & P.

NO additional generation was added during 1944, and none is planned for 1945. No transmission was added during the past year. For 1945-6, it is planned to install a Peterson coil and three sectionalizing oil circuit breakers on the 45-kv. system. Miles of distribution added were 2.35. Contemplated betterments during 1945 call for an expenditure of $125,000 for 4-kv. cutover. Substation additions for the past year included 821 kva. in transformer capacity and 90 kva. in static condensers.—*M. A. Pooler, president and general manager.*

Salt River Valley Assn.

THERE were no major additions or improvements made to the generating facilities of the association during the year of 1944 and none have been contemplated for 1945, as present capacities and purchase contracts seem adequate for the anticipated load.

The transmission system was increased by the construction of 4½ miles of 69-kv. line and an additional ten miles of 44-kv. line is contemplated for construction during 1945. Also scheduled is the enlarging of certain substations, by approximately 10,000 kva. Estimated cost of construction is $95,000.

The distribution system was increased by the construction of 15 miles of 11,000- and 2,300-volt line, and the installation of a 7,500-kva. synchronous condenser. Anticipated construction for 1945 is ten miles of 11,000- and 2,300-volt line, and 6,750 kva. of additional substation capacities at an estimated cost of $75,000. —*F. L. Roe, superintendent of power.*

California

Burbank Public Service Dept.

DURING 1944 new construction caused a capital increase of approximately $188,000 for the electrical utility system including production, transmission and distribution plant. Due to WPB restrictions, new construction work included only those projects which were absolutely necessary to supply additional war production requirements. Many urgent system betterment jobs were postponed until material and labor are more readily available.

Generation: New construction for generation has included only small miscellaneous jobs in the steam plant. This plant now consists of two Allis-Chalmers 10,000-kw. steam-electric generating units of the same design, and three Babcock and Wilcox boilers.

Load has increased so rapidly since Unit No. Two was completed that it now seems desirable to begin engineering investigation in 1946 for a third unit of 15,000-kw. capacity.

Transmission: During 1944 one mile of 34.5-kv. line was added to the 34.5-kv. power transmission system. This line addition is 4/0 bare copper, wood pole construction, 46-kv. line post insulators similar to existing construction, and is capable of transmitting 24,000 kva. It was constructed to supply the new 10,000-kva. Winona substation. Because of increased load, approximately one mile of 1/0 and 2/0 line in one section of the 34.5-kv. transmission line was replaced by 4/0 conductor.

The 34.5-kv. transmission system now consists of a six-section loop system which interconnects three 10,000-kva. substations, one 6,000-kva. substation, the main Burbank distribution station, and Station E of the City of Los Angeles Department of Water and Power. The steam plant delivers power to the 4.3-kv. Burbank distribution station at 4.3 kv., and this station is connected into the 34.5-kv. transmission system through two 10,000-kva. transformer banks.

Four of the six sections of the 34.5-kv. transmission system are protected by Westinghouse type HCB, high-speed, pilot wire, differential relays at the present time. Three flashover faults have been cleared by these relays with an average clearing time of six cycles. The same type relays will be installed on the two remaining line sections during the early part of 1945.

Distribution: Of the $188,000 of new construction for the electric utility system as a whole during 1944, approximately $148,000 was spent on distribution plant equipment. Approximately $58,000 was spent on new distribution plant construction for all additions other than substations.

The War Housing program for 1944 added approximately 1,500 new domestic consumers. Most of the housing units added consisted of new subdivisions which required new distribution facilities. Approximately 1,300 kva. of distribution transformer capacity was added to the system during the year to serve domestic and commercial load. Line additions, other than 4/0 feeder line, amounted to approximately 5½ miles of line of miscellaneous size conductors. Approximately 1½ miles of new 4/0, 4.3-kv. primary feeder line was constructed for power distribution from a new 10,000-kva. substation to the Lockheed area. Also many new power services were required by small industrial plants which were built during the year. Distribution system betterments contemplated for 1945 consist mainly of replacing poles which are in dangerous condition and transformers which will be overloaded beyond reasonable limits.

Substations: Approximately $90,000 was expended in the construction of distribution substations during 1944. The increase in load in the Lockheed plant area required the construction of a new 34.5/4.3-kv., 10,000-kva. substation called Winona distributing station. This substation was connected into the 34.5-kv. transmission system. It has two 5,000-kva. transformer banks, and five 4.3-kv. distribution feeders. The total cost of this substation was approximately $66,000, and it was the largest single project constructed during the year. Engineering was completed and material ordered for the installation of General Electric Co. Type IFD differential relays on all 34.5-kv. substation buses. The installation of this relay protection will be made early in 1945.

Many small consumers' substations and power services, totaling approximately 2,000-kva. transformer capacity, were added during the year. Very little change was made in the large

substations. Several substation betterment projects are contemplated for installation after the war, such as adding double bus circuit breakers, 4.3-kv. feeder reactors, and 34.5-kv. lightning arresters on large transformer banks. Engineering for these jobs will be started in 1945.

General: In line with WPB regulations, apparatus has been overloaded to the limit where necessary to postpone purchasing equipment, and all available spare equipment has been restored to service. Maintenance standards have been reduced and, where possible, maintenance has been deferred to 1945. Due to the small amount of new construction now anticipated for 1945, time will probably be available to do the maintenance work which is now becoming urgent. After the war, much new construction and rebuilding will be necessary to replenish necessary reserve capacity in order to assure the fine quality of service recognized as standard by the department.

The annual system peak demand is 6.7% higher than for the previous year, which is very close to the anticipated demand. Energy consumption showed a 9.1% increase over 1943. Since a large portion of our total load is due to the aircraft industry in Burbank, we anticipate a reduction of approximately 40% in peak kw. load at the conclusion of the war, based on the peak demand experienced in 1944.—*J. H. McCambridge, general manager.*

California Electric Power

CONSTRUCTION expenditures authorized in 1944 totaled $1,123,240, including $25,460 for generation, $53,710 for transmission, $523,480 for distribution, and $429,680 for substations. A total of $1,902,700 is proposed for construction in 1945. The 1944 expenditures were as follows:

Generation: Modernization of plant, prime mover and electric facilities, $25,460.

Transmission: Re-poling and reconductoring, $37,040; additional guying and reconstruction of river crossing structure, $7,730; construction of one switching station and improvements at another, $5,210; installation and modernization of sectionalizing switches, $1,830; miscellaneous small items, $1,900.

Distribution: 88 miles of line added, including 39 miles of rural lines, improvement and modernization of existing lines, $83,820; and extensions for new customers, including related reconstruction and improvement of existing lines, $439,660.

Substations: 24,375 kva. of transformer capacity added (16,775 kva.

Western REA Systems

System	Borrower's Name	Cumulative Construction Allotments Nov. 30, 1944	1944 Construction Allotments	Consumers Connected 11/30/44
ARIZONA	**State Totals**	**$ 1,301,000**	**$ 18,000**	**2,008**
2 S. E.	Stonewall Elec. Co., Tucson	100,000	.....	226 (a)
4 Pinal	San Carlos Irrig. & Drainage Dist., Coolidge	145,000	.....	308 (a)
14 Cochise	Sulphur Springs Valley Elec. Co-op., Inc., Wilcox	1,038,000	.....	1,474 (a)
16 Mohave	Littlefield Elec. Co-op., Inc., Littlefield	18,000	18,000	(*)
CALIFORNIA	**State Totals**	**$ 2,717,500**	**$ 260,000**	**4,334**
1 Imperial	Imperial Irrigation Dist., Imperial	700,000	.....	2,008 (a)
6 Modoc	Surprise Valley Elec. Corp., Alturas	788,500	.....	1,042
16 Plumas	Plumas-Sierra Rural Elec. Co-op., Portola	392,000	.....	717
18 San Diego	Mountain Empire Elec., Co-op., Inc., Campo	152,000	.....	567
24 Bard D. P.	Bard Laguna Elec. Co-op., Bard	25,000	.....	(*)
26 Fresno	Foothill Elec. Assn., Inc., Fresno	260,000	260,000	(*)
27 Humboldt	Redwood Elec. Co-op., Garberville	400,000	.....	(*)
COLORADO	**State Totals**	**11,824,810**	**1,247,000**	**18,992**
7 Mesa	Grand Valley Rural Power Lines, Inc., Grand Junction	423,000	.....	1,200
14 Alamosa	San Luis Valley Rural Elec. Co-op., Monte Vista	786,000	200,000	1,043
15 Morgan	Morgan Co., Rural Elec. Assn., Fort Morgan	1,090,000	250,000	1,192
16 Jefferson	Intermountain Rural Elec. Assn., Bailey	801,000	.....	1,574
18 Prowers	Southeast Colo. Power Assn., La Junta	1,467,810	.....	2,758
18 Gunnison	Gunnison Co. Elec. Assn., Inc., Crested Butte	335,000	.....	380
20 Delta	Delta-Montrose Rural Power Lines Assn., Delta	578,000	.....	1,338 (a)
21 S. E.	Stonewall Elec. Co., Trinidad	39,000	.....	170
22 Boulder	Union Rural Elec. Assn., Inc., Brighton	475,000	65,000	1,234 (a)
25 Pueblo	San Isabel Elec. Assn., Inc., Pueblo	210,000	35,000	412
26 San Miguel	San Miguel Power Assn., Inc., Nucla	251,000	.....	635
(b) 29 Phillips	High Line Elec. Assn., Holyoke	1,825,000	480,000	1,592
31 Larimer	Poudre Valley Rural Elec. Assn., Inc., Severance	646,000	65,000	1,536
32 LaPlata	La Plata Elec. Assn., Inc., Ignacio	280,000	.....	635
33 Dolores	Empire Elec. Assn., Inc., Dove Creek	615,000	.....	1,356 (a)
34 Eagle	Holy Cross Elec. Assn., Inc., Basalt	470,000	.....	575
35 Chaffee	Sangre De Cristo Elec. Assn., Inc., Salida	302,000	152,000	34 (a)
36 Routt	Yampa Valley El. Assn., Inc., Steamboat Spgs.	170,000	.....	270
37 Douglass	Mountain View Elec. Assn., Inc., Colo. Spgs.	1,061,000	.....	1,058
IDAHO	**State Totals**	**$ 4,101,250**	**$ 15,000**	**7,373**
(c) 4 Bonner	Northern Idaho Rural Elec. Rehabilitation Assn., Inc., Sandpoint	880,750	.....	1,148
10 Nez Perce	Clearwater Valley Light & & Power Assn., Lewiston	1,458,000	.....	2,564
11 Kootenai	Kootenai Co. Rural Elec. Assn., Inc., Coeur d'Alene	326,000	15,000	1,232
14 Valley	Long Valley Power Co-op., Inc., Donnelly	341,000	.....	376
15 Idaho	Idaho Co., Light & Power Co-op. Assn., Inc., Grangeville	332,500	.....	509
16 Cassia	Raft River Rural Elec. Co-op., Inc., Malta	111,000	.....	255
17 Fremont	Fall River Rural Elec. Co-op., Inc., Ashton	340,000	.....	707
19 Butte	Lost River Elec. Co-op., Inc., Arco	214,000	.....	443 (a)
21 Camas	Prairie Power Co-op., Inc., Fairfield	98,000	.....	139
MONTANA	**State Totals**	**$ 3,873,298**	**$ 236,000**	**7,493**
1 Ravalli	Ravalli Co. Elec. Co-op., Inc., Corvallis	183,700	.....	484 (a)
2 Cascade	Sun River Elec. Co-op., Inc., Fairfield	478,500	.....	1,147
5 Richland	Lower Yellowstone Rural Elec. Assn., Inc., Sidney	176,600	.....	521
9 Yellowstone	Yellowstone Valley Elec. Co-op., Inc., Huntley	398,498	.....	1,278
10 Madison	Vigilante Elec. Co-op., Inc., Twin Bridges	485,000	.....	648
12 Missoula	Missoula Elec. Co-op., Inc., Missoula	247,000	.....	422
13 Flathead	Flathead Elec. Co-op., Inc., Kalispell	245,000	.....	587
15 Fergus	Fergus Elec. Co-op., Inc., Lewistown	378,000	.....	594
16 Park	Park Elec. Co-op., Inc., Livingston	233,000	.....	291
17 Rosebud	Mid-Yellowstone Elec. Co-op., Inc., Hysham	185,000	.....	383
19 Stillwater	Beartooth Elec. Co-op., Inc., Absarokee	292,000	.....	616
(d) 21 Big Horn	Big Horn Co. Elec Co-op., Inc., Lodge Grass	249,000	41,000	522
24 Blaine	Big Flat Elec. Co-op., Inc., Turner	45,000	.....	(*)
25 Sheridan	Sheridan Co. Elec. Co-op., Inc., Westby	37,000	.....	(*)
26 Valley	Northern Elec. Co-op., Inc., Opheim	45,000	.....	(*)
27 Glasgow	Valley County Elec. Co-op., Inc., Glasgow	195,000	195,000	(*)
NEVADA	**State Totals**	**$ 249,000**	**$ 5,000**	**449**
3 Alamo D.P.	Alamo Power Dist. No. 1, Alamo	32,000	5,000	(*)
4 Overton	Overton Power Dist. No. 5, Overton	217,000	.....	449
NEW MEXICO	**State Totals**	**$ 1,955,000**	**$ 185,000**	**3,421**
4 Eddy	Central Valley Elec. Co-op., Inc., Artesia	371,000	30,000	508
8 Roosevelt	Roosevelt Co. Elec. Co-op., Inc., Portales	287,000	20,000	741
9 Curry	Farmers Elec. Co-op., Inc., Clovis	289,000	35,000	721
11 Taos	Kit Carson Elec. Co-op., Taos	370,000	.....	628
12 Otero	Otero Co. Elec. Co-op., Inc., Cloudcroft	145,000	.....	337 (a)
13 S.E.	Stonewall Elec. Co., Albuquerque	216,000	.....	486
14 Mora	Mora-San Miguel Elec. Co-op., Inc., Mora	177,000	.....	...
17 Sierra	Sierra Elec. Co-op., Inc., Hillsboro	100,000	100,000	...
OREGON	**State Totals**	**$ 5,776,500**	**$1,045,500**	**7,685**
2 Lane	Blachly-Lane Co. Co-op. Elec. Assn., Blachly	307,000	25,000	341 (a)
4 Lincoln	Benton-Lincoln Elec. Co-op., Inc., Corvallis	1,035,000	.....	1,327 (a)
5 Clatsop	Nehalem Valley Co-op. Elec. Assn., Jewell	119,000	.....	217
14 Umatilla	Umatilla Elec. Co-op. Assn., Hermiston	293,000	.....	778 (a)
16 Malheur	Malheur Co-op. Elec. Assn., Vale	278,000	.....	439
17 Douglas	West Douglas Elec. Co-op., Inc., Roseburg	811,500	.....	1,349
18 Eugene	Lane Co. Elec. Co-op., Inc., Eugene	708,000	.....	771

System	Borrower's Name	Cumulative Construction Allotments Nov. 30, 1944	1944 Construction Allotments	Consumers Connected 11/30/44
19 Jordan Valley	Jordan Valley Elec. Co-op., Inc., Jordan Valley	30,000	.....	92
(e) 21 Coos	Coos Elec. Co-op., Inc., Coquille	970,000	519,500	936
22 Clackamas	N. E. Clackamas Co. Elec. Co-op., Inc., Sandy	86,000	.....	225
25 Deschutes	Central Elec. Co-op., Inc., Redmond	331,000	10,000	697 (a)
26 Wasco	Wasco Elec. Co-op., Inc., The Dalles	348,000	.....	513
32 Columbia	West Oregon Electric Co-op., Inc., Veronia	460,000	460,000	(*)
UTAH	**State Totals**	**$ 1,290,000**	.....	**2,257**
6 Garfield	Garkane Power Assn., Inc., Hatch	576,000	.....	1,081
8 Duchesne	Moon Lake Elec. Assn., Inc., Mt. Emmons	671,000	.....	1,131
9 Beaver	Beaver Valley Elec. Assn., Beaver City	12,000	.....	45 (a)
11 Millard	Flowell Elec. Assn., Inc., Fillmore	31,000	31,000	(*)
WASHINGTON	**State Totals**	**$ 8,243,419**	**$ 448,000**	**12,960**
8 Benton	Benton Rural Elec. Assn., Prosser	392,500	10,000	1,090
9 San Juan	Orcas Power & Light Co., Eastsound	476,000	.....	680
14 King	Mutual Power & Light Assn., North Bend	22,919	.....	32 (a)
17 Klickitat	Public Utility Dist. No. 1 of Klickitat Co., White Salmon	550,000	.....	270
18 Spokane	Inland Empire Rural Electrification, Inc., Spokane	2,110,000	100,000	3,802
20 Columbia	Columbia Co. Rural Elec. Assn., Inc., Dayton	351,000	.....	486
23 Grays Harbor	Quinault Light Co., Quinault	82,000	3,000	...
25 Cowlitz	P. U. Dist. No. 1 of Cowlitz Co., Longview	221,000	.....	680 (a)
27 Lewis	P. U. Dist. No. 1, Chehalis	409,000	.....	1,369
28 Kittitas	P. U. Dist. No. 1 of Kittitas Co., Ellensburg	151,000	.....	306
30 Stevens	Stevens Co. Elec. Co-op., Inc., Colville	668,000	35,000	1,074
31 Chelan	Chelan Co. Elec. Co-op., Inc., Leavenworth	106,000	40,000	120 (a)
32 Okanogan	Okanogan Co. Elec. Co-op., Inc., Winthrop	170,000	.....	331
35 Pend Oreille	Pend Oreille Elec. Co-op., Inc., Newport	331,000	.....	460 (a)
36 Adams	Big Ben Elec. Co-op., Inc., Ritzville	432,000	.....	342
37 Lincoln	Lincoln Elec. Co-op., Inc., Davenport	632,000	10,000	606
39 Nespelem	Nespelem Valley Elec. Co-op., Inc., Nespelem	106,000	.....	303
42 Clallam	P. U. Dist. No. 1 of Clallam Co., Forks	183,000	.....	346 (a)
45 Grant D.P.	P. U. Dist. No. 2 of Grant Co., Ephrata	600,000	.....	663 (a)
47 Douglas	P. U. Dist. No. 1 of Douglas County, Waterville	250,000	250,000	(*)
WYOMING	**State Totals**	**$ 3,497,000**	**$ 30,000**	**5,433**
3 Fremont	Riverton Valley Elec. Assn., Inc., Riverton	261,000	.....	563
5 Big Horn	Big Horn Rural Elec. Co., Basin	401,000	.....	909
6 Goshen	Wyrulec Co., Lingle	457,000	.....	925
9 Uinta	Bridger Valley Elec. Assn., Inc., Mountain View	172,000	.....	341 (a)
10 Platte	Wheatland Rural Elec. Assn., Wheatland	110,000	30,000	222
11 Lincoln	Lower Valley Power & Light, Inc., Freedom	420,500	.....	806
12 Park	Garland Light & Power Co., Powell	72,300	.....	189 (a)
13 Washakie	Washakie Rural Elec. Co., Worland	56,500	.....	154
(f) 14 Laramie	Rural Electric Co., Pine Bluffs	966,000	.....	736 (a)
16 Hot Springs	Hot Springs Co. Rural Elec. Assn., Thermopolis	88,000	.....	(*)
17 S. E.	Stonewall Elec. Co., Sheridan	78,700	.....	126 (a)
21 Carbon	Carbon Power & Light Co., Saratoga	314,000	.....	383 (a)
23 Shoshone	Shoshone River Power, Inc., Cody	100,000	.....	79

(*) Not energized.
(a) Estimated.
(b) Operates in Nebraska as well as Colorado.
(c) Operates in Montana as well as Idaho.
(d) Operates in Wyoming as well as Montana.
(e) Operates in California as well as Oregon.
(f) Operates in Colorado and Nebraska as well as Wyoming.

Western REA Generating Plants

As of November 30, 1944

System	Location	Kw. Capacity	Type	Status
Arizona 14 Cochise	*Benson, McNeal and *Willcox	1,890	Nat'l Gas, D	Operating
California 6 Modoc	*Paisley, Ore., and Alturas, Calif.	847	Hydro, Diesel	Operating
*Colorado 16 Jefferson	Elizabeth	148	Diesel	Operating
Colorado 17 Prowers	*Springfield and *Eads	741	Diesel	Operating
*Colorado 26 San Miguel	Norwood	43	Diesel	
Colorado 34 Eagle	*Gypsum and *Eagle	375	Hydro, Diesel	Operating
*Colorado 37 Douglas	Limon	386	Diesel Standby	
*Idaho 14 Valley	Grimes Pass	1,480	Hydro, Diesel	
*Idaho 17 Fremont	West Yellowstone, Mont.	177	Diesel	Operating
*Idaho 19 Butte	MacKay	160	Hydro, Diesel	
*New Mexico 11 Taos	Taos, New Mexico	420	Diesel	Operating
Oregon 2 Lane	Blachly	150	Hydro	Operating
*Oregon 21 Coos	Port Orford, Ore.	150	Diesel	
*Oregon 26 Wasco	Maupin	400	Hydro	Operating
Utah 6 Garfield	Hatch and *Torrey	510	Hydro, Diesel	Operating
Utah 8 Duchesne	Yellowstone, Utah	600	Hydro	Operating
Wash. 9 San Juan	Eastsound, Wash., *Friday Harbor and Lopez	642	Diesel	Operating
Wash. 23 Grays Harbor	Ziegler Creek	250	Hydro	Operating
*Wash. 42 Clallam D.P.	Forks	300	Diesel	Operating
Wyoming 9 Uinta	Lyman	224	Natural Gas	Operating
Wyoming 11 Lincoln	Freedom	600	Hydro	Operating
Wyoming 14 Laramie	*Burns	74	Diesel	Operating
Wyoming 21 Carbon	*Encampment and *Saratoga	226	Diesel	Operating

* Acquisition.
In addition there are 23 mobile units, of which 3 are 120-kw. capacity and 20 are 100-kw. capacity.

at existing substations and 7,600 kva. at eleven new substations), $345,320. Of this amount, 3,750 kva. is for contractors' construction service in military areas; 9,750 kva. in increased capacity for loads in military areas; 2,650 kva. for increased industrial loads; and 8,225 kva. for general service areas. Other substation improvements included: Addition of 33-kv. step-voltage regulator; addition and modernization of switching and relay installations serving essential loads; improvement and modernization of lightning protection facilities; and reconstruction necessitated by changing over to 4,800-volt primary in rural areas, total $84,280.

Other improvements: Transportation and automotive work equipment, $23,750; new cottages and related structures, $22,010; radiophone equipment, $23,480; miscellaneous small items including new patrol roads, additions to buildings, and wire communication system improvements, $21,080.

Proposed 1945 Construction Program

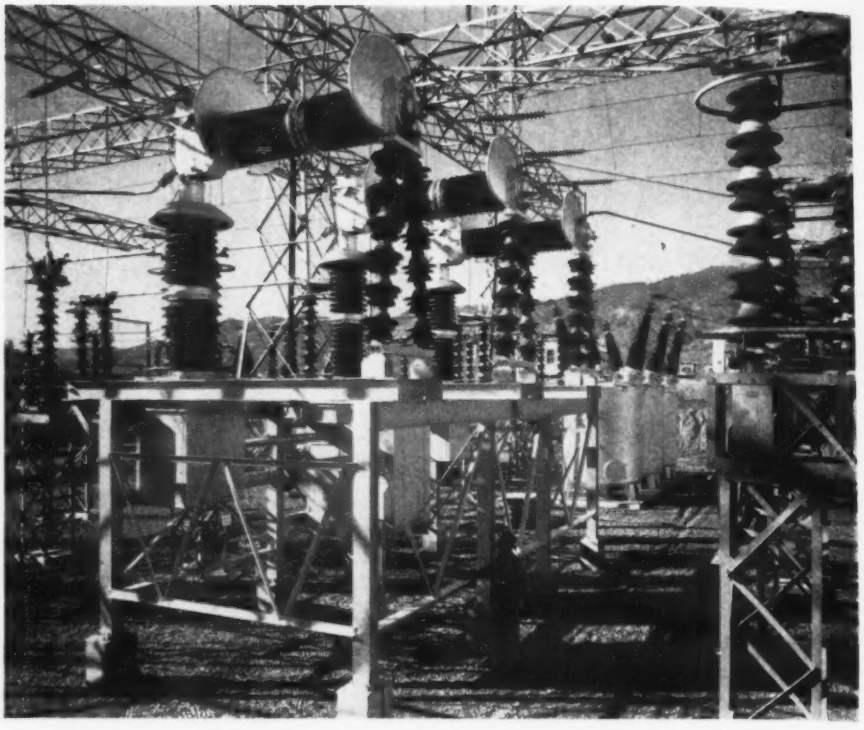
Generation	$34,170
Transmission	217,100
Distribution	941,900
Substation and equipment	457,050
Other system improvements	252,480
	$1,902,700

Principal items budgeted for 1945 are: 15 miles of 55-kv. transmission line and terminal facilities $75,000; 24 miles of 33-kv. transmission line and terminal facilities, $230,000, and 44 miles of 33-kv. distribution line and terminal facilities, $168,950. The terminal facilities referred to include 12,750 kva. in substation capacity representing an estimated expenditure of $171,650. Other substation expenditures estimated at $135,880 contemplate 5,600 kva. increase in transformer capacity, including four new substations (2,950 kva.) and additions to five substations (2,650 kva.). Substation improvements exclusive of capacity changes are estimated at $127,760.

Generation: Includes approximately $26,000 for additional living quarters and related structures.

Transmission: Other contemplated transmission expenditures include reploing, $16,800; new patrol roads, $10,500; and miscellaneous small items, $7,000.

Distribution: Includes $504,400 for extensions for new customers, together with necessary incidental reconstruction and improvements; reploing, $35,310; improvement and modernization of existing lines, $173,700; and installation of additional sectionalizing switches in loop lines, $2,330. Proposed additional living quarters, storeroom building and alterations to



Section of switchyard at Shasta Dam power plant showing one of the 230-kv. three cycle, impulse, oil circuit breakers. Two of an ultimate five 75,000-kw. generators were placed in operation at Shasta Dam in July 1944. Shasta power reaches war loads in northern California via the PG and E system at Shasta sub and Oroville

existing structures will require expenditures approximating $32,200.

Other System Improvements: Contemplate additional office buildings, $30,000; automotive equipment (contingent upon ability to obtain), $163,000; and reconstruction of wire communication facilities, $4,000.

Installation of one radiophone project, for which authority was received in 1944, will actually be made early in 1945. The equipment to be installed will include two fixed stations and two mobile units and will be used in connection with the operation of a transmission line lacking other communication facilities. The expenditure will approximate $12,100. Contemplated extension of existing radiophone facilities will also require an additional expenditure of approximately $13,700.

In addition to the foregoing construction budget, our operating department has submitted a maintenance budget on the order of $400,000, approximately half of which is for work at generating plants and related structures.

The extent to which we are enabled to undertake and complete the 1945 construction and maintenance program will be determined, in a large measure, by the availability of manpower and materials. As materials are made available, those items of construction or maintenance will be scheduled in the order of their importance to the continuance and improvement of service to military areas and essential industries. If the general condition of equipment warrants it, a given job will be done if materials can be obtained.—*R. H. Halpenny, chief engineer.*

Central Valley Project, USBR

CONSTRUCTION of Shasta Dam and power house was completed in 1944, except for minor miscellaneous items. Two 75,000-kva. main units, No. 3 and No. 4, and the two 2,500-kva. station service units were placed in operation during June 1944. Reservoir clearing was practically completed during 1944. Work authorized by the War Production Board on the Keswick Dam and power house was completed in 1944. The dam and power house are approximately 95% completed. Installation of the three 25,000-kva. generating units has been postponed until some future date, due to war conditions. The 100-mile long Shasta-Oroville 230-kv. transmission line was completed and energized during July 1944. The remaining 28 miles of the 36-mile Madera Canal is under contract and is expected to be completed in March 1945.

Additional work authorized by WPB on Friant Dam was completed during 1944, which practically completes the dam except for installation of spillway gates and outlet facilities for Friant Kern Canal, Madera Canal and river outlets. Construction of the Friant Kern Canal and resumption of construction of the Contra Costa Canal depend upon action by the War Production Board. Funds available are $17,061,600.

Coast Counties G. & E.

NO changes were made in our generation capacity or transmission system during the year 1944. During the year 1945 we have an addition of 10 miles of transmission line in prospect, estimated cost, $80,000. During 1944, 15½ miles of distribution line were added, largely to connect agricultural pumping installations. Approximately $40,000 were spent on replacement and rebuilding of distribution lines during the year 1944, consisting of necessary replacements only. Our estimate of replacements and rebuilding of distribution lines in the year 1945 indicates that we will expend about $45,000 for this purpose.

During 1945 we also contemplate the addition of 240 kva. in voltage regulators on rural lines and 900 kva. in line capacitors. We have made no changes of consequence in substations during the year 1944 and we have no major distribution changes planned for 1945.

We expect that our rural expansion program during the year 1945 will be about the same as last year, namely, approximately 15½ miles of new lines will be constructed to serve new customers.—*A. E. Strong, general superintendent.*

City of Glendale

IN regard to our expansion for 1945, we have none planned with the exception of the addition of one 20,000-kw. steam unit which we now have on order and hope to bring in on the line in the fall of 1946.

At the present time, it does not look as though we would do any expansion to our distribution or substations during 1945, with the exception of routine maintenance.—*B. H. Martin, assistant superintendent.*

Imperial Irrigation District

IN the latter part of 1943 the district purchased the California Electric Power Co.'s holdings in the Imperial and Coachella Valleys and those along the Colorado River in the Winterhaven and Andrade areas. In the early part of 1944 it also purchased the properties of the Imperial Valley Electric Power Co. which lie in the Bard and Winterhaven areas.

During 1944 our major program

has been the consolidation of the various properties into a unified system. Because of the urgency of stepping up the war effort, the district has undertaken only those items of work which were absolutely necessary to assure dependable service.

At the Drop 4 hydro plant on the All-American Canal, a 25,000-kva. 88/34.5-kv. bank was installed to take power from the hydro plants and the U. S. Bureau of Reclamation system at 34.5 kv. and step up to 88 kv. for transmission over the former California Electric Power Co. 88-kv. Yuma-El Centro-Coachella line, thus replacing power formerly supplied from San Bernardino.

At the former California Electric Power Co. El Centro terminal station, the district's 34.5-kv. transmission loop was cut in through a 7,500-kva. 88/34.5-kv. bank, thereby forming a central tie between the former California Electric Power Co. 88-kv. transmission and the district's 34.5-kv. transmission systems. A portion of the 16.5-kv. lines from Terminal station have been cut over to 34.5 kv. and the remainder will be changed in the near future. Henceforth, only 88 and 34.5 kv. will be used for transmission in the Imperial Valley area.

A new 88-kv. H-frame type transmission line connecting El Centro and Drop 4 hydro plant is now under construction. This line will parallel the "Y" line and is of ample capacity to carry the entire system load in case of failure of the "Y" and the 34.5-kv. lines.

A very extensive distribution cut-over program is planned for the entire system but it is not probable that much progress will be made on this work until Germany is defeated. All former California Electric Power Co. 2,300- and 16,500-volt lines will be cut over to the district's 4,160- and 12,500-volt system. The major portion of this work will require very little new material.

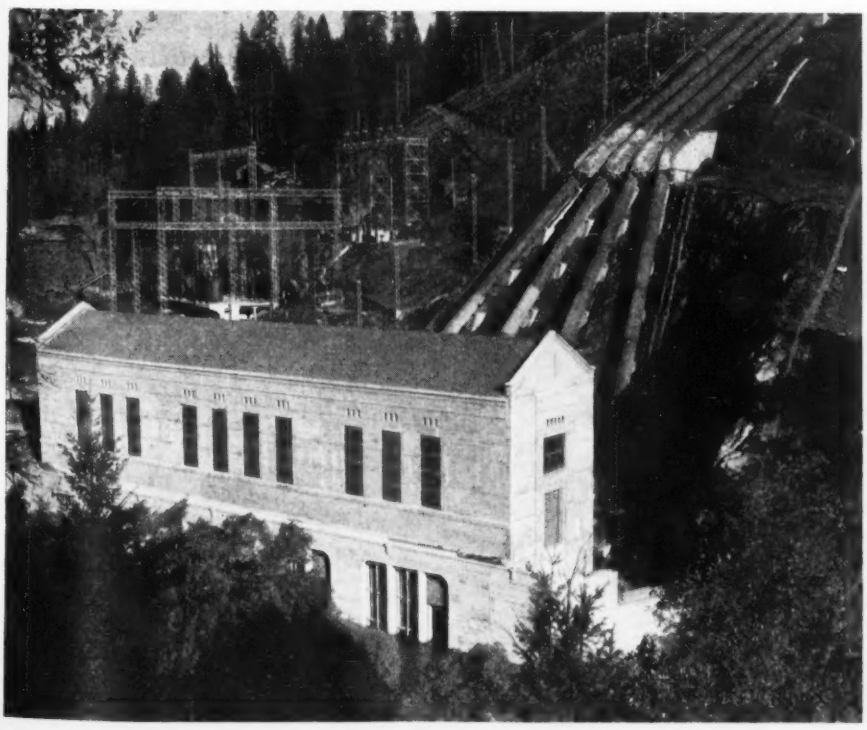
Rural extensions have been held to a minimum during 1944, only those being built which have had definite connection with the war effort or food production. Considerable expansion is expected as soon as the war is over but the major portion will be made with used material removed from the California Electric Power Co. system on the conversion program.

The U. S. Marine Corps air station near El Centro and the U. S. Naval training station near Holtville have very materially increased their loads during 1944, thereby necessitating the construction of new substations to take care of the increased demands. General system load growth has been noticeable throughout the year.

Plans are well under way for the construction of a new 40,000-kva. hydroelectric plant at Pilot Knob on the All-American Canal. Mr. William P. Creager, consulting hydraulic engineer of Buffalo, N. Y., is under contract to work with M. J. Dowd, consulting engineer for the district, on the design of the plant and the preparation of plans and specifications for material and equipment, and for the construction and installation. Two new 162-kv. lines between Pilot Knob and Drop 4 hydro plant are contemplated under this same project. Construction is scheduled to begin before the middle of 1945. The total expenditure will be around $5,500,000 and it will require about one year for completion.

The 1945 construction program also includes the installation of a new 7,500-kva. bank at Calexico to serve the Mexicali load which is showing a very rapid growth. This installation will be completed in February or March of 1945.

After the war it is planned to spend about $955,000 for distribution changes and betterments. — *E. H. Aiken, chief electrical engineer.*



Pit 5 power plant of Pacific Gas and Electric Co., with its four 40,000-kva. generators, was an important addition to generation in California during 1944 Power is fed into existing transmission for delivery to distant load centers. Pit 5 is notable for design features making for simplicity, reliability and low cost of plant operation

Los Angeles Dept. of W. & P.

THE 1944 construction program was limited to such additions and betterments as were necessary to meet the increased demands of war industries and the housing of essential war workers in this area.

There was no change in generating capacity during the year. However, a 100,000-kva. interconnection was installed between the department's 60-cycle system and the Southern California Edison Co.'s unit 8R at the Long Beach steam plant.

There was no change in transmission facilities during the year.

The removal of 34.5-kv. lines, no longer required due to the consolidation of properties acquired from the Los Angeles Gas and Electric Co. system with the department's power system, resulted in a net decrease of 9.6 miles in the 34.5-kv. overhead system. However, there was an increase of 22 circuit miles in the overhead primary and secondary distribution system, largely required to serve expanded housing facilities for essential war workers. There was no change in the underground distribution facilities during the year.

To meet the increased demands of war industries in this area, transformer capacities were increased by 18,250 kva. at distributing stations; by 18,500 kva. at industrial stations, and by 1,167 kva. at commercial stations.

The construction program for 1945 will entail an estimated expenditure of $10,000,000. This amount includes funds allocated to resume work on projects deferred due to the war, in the event that hostilities in the European theater should cease during 1945. The actual construction activity will depend upon the restrictions imposed by war activities. The major projects pro-

posed by the department are as follows:

At the Harbor steam plant a 4,000-kw. house turbine generator unit will be installed as a source of power for auxiliaries. Initial construction is scheduled to start for the installation of a second 65,000-kw. main unit at this plant. This unit is scheduled for operation in 1947.

A new 132-kv. single-circuit transmission line will be constructed between Receiving Station "B" and Receiving Station "D". This line will consist of 7.3 miles of overhead line and 5.3 miles of underground line. This new line will serve as a second source of supply to Receiving Station "D" and will also increase the transmission capacity of the Boulder transmission line by approximately 40,000 kw.

Additions to the distribution system will comprise 20 miles of overhead line and 20 miles of primary and secondary underground cable.

Additions to substations will include the expansion of Receiving Station "F" to provide for future load growth, and the initial construction on Distributing Stations 28 and 49. The expansion of Receiving Station "F" will involve the addition of a 75,000-kva., 132-34.5-kv. transformer bank, and related 132-kv. and 34.5-kv. positions and the construction of a new control house to provide for the increased capacity at this station. Distributing Stations 28 and 49 will be of the same general design as present department stations and will have transformer capacities of 30,000 kva. and 10,000 kva., respectively.

If war activities permit, the conversion to 5,000-volt operation of the 2,300-volt and 4,000-volt systems will be resumed along with other work deferred.—*C. P. Garman, assistant chief electrical engineer.*

Pacific Gas and Electric

TO complete additions to electric generating and transmission facilities and improvements to distribution plant needed to meet system growth, the company expended approximately $17,000,000 during 1944. An expenditure of about $18,000,000 is planned for 1945, the major part of which is allocated to distribution changes and betterments. While studies are under way for additional generating and transmission capacity for the postwar period, the timing of such additions depends largely upon the progress of the war and the release of restrictions on equipment and materials and availability of manpower.

Generation: In the year just passed 160,000 kva. were added to Pacific Gas and Electric Co.'s system generating capacity at Pit No. 5 power house, in four units of 40,000 kva. each. This was the only addition to generating plant made during 1944 and its completion marked the conclusion of the company's long-term construction program started in 1937.

No new generating capacity, either steam or hydro, will be brought in in 1945. Current estimates indicate that the system peak reached in August 1944, amounting to 1,601,900 kw.,* is the maximum to be expected during the war period. A reduction in both maximum peak and kilowatt-hour output is likely in 1945 due to curtailed production of light metals in the northern California area and to some reduction in shipyard activities. The present generating capacity in the area served by the company, together with power available from interconnections with other areas, is considered to be more than adequate to meet 1945 system requirements.

Transmission: The only important changes to the company's transmission lines completed during 1944 were those needed to complete the delivery of power from Pit 5 and Shasta Dam. Some 315 circuit miles of 220-kv. circuit were involved in these changes. The actual new line construction required, however, was relatively small, having been kept to the absolute minimum in order to conserve critical copper, steel and manpower. Between Vaca and Contra Costa substations, the 110-kv. operating voltage on the existing circuit was increased to 220 kv. No changes in construction were required except for reconductoring the Sacramento-San Joaquin River crossing with 795 MCM ACSR and a slight increase of insulation value of insulator strings. A new line of double-circuit towers was required between Mocho Junction and Newark, a distance of 18.25 miles, carrying a single circuit of 795 MCM ACSR. This was connected at Mocho Junction to an existing 220-kv. circuit from Contra Costa to deliver power to Newark substation. A second 220-kv. circuit was provided between the terminal of the Bureau of Reclamation's Shasta-Oroville line and Herndon, with a tie to Newark at Bellota substation. This was accomplished by increasing the operating voltage between Bucks Creek and Wilson from 165 kv. to 220 kv., for which the line was originally constructed, and by re-insulating for 220-kv. operation one circuit of the 42-mile double-circuit line constructed for 110 kv. between Wilson and Herndon substation. Sectionalizing switches, transformer and synchronous condenser installations required in connection with the transmission improvements are discussed in a subsequent paragraph.

In addition to the foregoing, a second 110-kv. circuit was constructed between Oleum Junction and Martinez steam plant, a distance of 9.5 miles, to provide an additional outlet from Contra Costa substation into the East Bay metropolitan area; 23.65 miles of 60-kv. line were also built to improve service to war industries; 22.1 miles of 60-kv. line were removed during the year.

Improvements and changes to the transmission system during 1945-46 cannot be predicted accurately since they are involved for the most part in plans for postwar construction and will depend upon the progress of the war. Since no large additions to generating capacity are planned for the year 1945, no major transmission construction is likely during this period. Although some tie lines for improvement of service may be constructed, the scheduling of this work will depend to a large extend on the availability of material and manpower.

Distribution: During 1944 some 450 miles of distribution lines were added and 33,000 kva. of static capacitors were installed on distribution lines throughout the system. The total amount expended for rebuilding and modernization was $8,400,000. While no individual distribution changes of major importance are planned for 1945, the aggregate of the several improvements contemplated will require an expenditure estimated at $10,900,000. Approximately 25,500 kva. of static capacitors will be connected to distribution lines during the coming year.

Substations: The most important substation improvements completed in 1944 were those identified with the receipt of power from Pit 5 power house and Shasta Dam. This involved major construction at six 220-kv. substations which has extended over a period of about two years time. The total facilities provided by this project included 361,500 kva. of transformer capacity and 165,000 kva. of synchronous condenser capacity, together with the necessary high-voltage switches and control equipment. That portion completed during the year just passed included a 90,000-kva. transformer bank at Contra Costa, two banks of 75,000 kva. each at Newark substation, two 35,000-kva. synchronous condensers at Newark, and one 25,000-kva. synchronous condenser at Herndon. An additional 25,000-kva. condenser has been delivered to Herndon, and its installation will be completed early in 1945. Net increase in substation transformer capacity for the entire system during 1944 was 435,000 kva.

Rural Expansion Program: Although

* This does not include demands of the aluminum reduction plant at Riverbank which were supplied principally by the output of San Francisco's Hetch Hetchy project.

rural electrification in the company's territory and in California generally has already extended far beyond that of other states, increased emphasis will be placed on our rural expansion program in 1945 and postwar years. The construction of more than 1,700 miles of rural lines is contemplated as soon as material and manpower are available for this purpose.

City of Palo Alto

CAPITAL additions to the municipal electric utility at Palo Alto, as expended for the fiscal year 1943-44 and as estimated for this year of 1944-45, are shown in the tabulation below:

	Expended 1943-44	Estimated 1944-45
Poles and fixtures	$3,906	$4,500
Overhead conductors	1,751	3,000
Transformers	1,650	1,000
Services	110	1,000
Meters	280	1,000
Street lighting	125	200

Two distributing substations of standardized design are planned by the Los Angeles Department of Water and Power for 1945. One will have capacity of 30,000 kva. and the other 10,000 kva. Construction for 1945 entails an estimated $10,000,000. Included is initial construction work for a second 65,000-kw. steam unit at Harbor plant

Generation: The City of Palo Alto is not generating any electricity but only keeping its diesel engine driven plant as a standby; and purchasing all energy from the Pacific Gas and Electric Co.

Substations: Palo Alto operates no substations outside of its one central distribution plant.

No major distribution changes and betterments are planned. Conditions of the times prevent any intelligent plans in our small residential community. Pole replacements make up our principal field for contemplated betterments.

Should the war take the continually hoped for and definite turn toward an early end, we can expect fur flying in residential construction. In the meantime, we are marking time.—*A. V. Youens, electrical engineer.*

San Diego Gas & Electric

DURING the year 1944 the construction program of the San Diego Gas & Electric Co. was devoted primarily to providing service for expanded military establishments and war factories. The growth of these facilities continued in the area served, although at a reduced rate of expansion. A number of federal and naval housing projects for war workers and enlisted personnel were likewise connected. The company's net additions to capital during the past year amounted to $1,375,000. The budget for 1945 contemplates the expenditures of $1,347,000 for net capital additions. No changes were made in generating capacity during the past year. The only transmission extension was 20.3 miles of 66-kv. line between Escondido and Camp Pendleton, thus completing an interconnection between Escondido and Oceanside. This provides a third line into the latter rapidly growing community. During 1945 we contemplate building a 25-mile, 66-kv. line from El Cajon to Descanso, to supplement the available supply in the mountain territory to the east of San Diego.

No major substations were installed during the past year, although the capacity of Mission Valley substation, which is the southern terminus of the interconnection with the Southern California Edison Co., was increased from 36,000 to 48,000 kva., by the addition of cooling fans on the transformers. Corresponding increases have been made by the Southern California Edison Co. at the Chino terminus of the line, thus increasing the over-all capacity for interchange between the two companies. The capacity of Camp Pendleton 66-12-kv. substation is to be increased during 1945 from 3,000 to 6,000 kva. No additional major substations are contemplated. In the distribution system various changes were made in 1944 to provide for increased loads. Several suburban systems were changed over from 2,400 to 4,100 volts, and some new substations were installed. The total transformer capacity added in such substations was 2,250 kva. The mileage of new distribution lines was 56.7.

Plans are being made for the extension of lines into rural territories, as soon as the necessary materials and labor become available, to supply customers who have been unable to obtain service because of war conditions. There will be some expansion into fringe territory as well, when such extensions are permissible. — *L. M. Klauber, vice-president and general manager.*

Riverside Electric Dept.

DURING the year 1944 very little other than maintenance and minor capital additions was carried on. However, a healthy gain was made in energy sales above the year 1943, and also a load factor improvement was realized. Considerable delayed distribution changes and improvements are anticipated as materials and manpower will warrant, not planned for the year of 1945 specifically.

Insofar as very little of the area served by our department would come under the classification of "rural," practically no consideration has been given to this particular subject.—*L. W. Grayson, superintendent.*

Southern California Edison

IN 1944 we spent approximately $4,500,000 for additions to plant, and improvement to existing facilities. Our budget for 1945 contemplates an expenditure of approximately $15,000,000.

No new generating capacity was added directly to the system, but the installation of the new N-7 generator at Boulder in the latter part of 1944 added 82,500 kw. of capacity to the area. This unit was ordered primarily for service to Defense Plant Corp. Looking to the future flexibility of operation in the plant, Edison company asked that the transformers be

designed so that they could be operated at 50 cycles. It was necessary to use a special type of transformer iron so as not to increase the size of these units. This was done so that N-7 transformers are satisfactory for 50-cycle operation. With the cut-back in light metal production at Basic Magnesium, this unit will not be needed by DPC. During acceptance test it was operated at 50 cycles to determine its availability at this frequency. This unit has been operating at 30,000 kw. at 50 cycles on the Edison company system since Nov. 17 so that, even if it is not a part of our generating capacity, it has enabled us to make use of some of the hydroelectric energy released by BMI in lieu of oil generated energy in Southern California. No additions were made to the major transmission system in 1944.

The total amount of energy transmitted in 1944 showed a 12% increase over 1943. An interesting feature of energy production on the system is indicated by the fact that for the three years—1940, 1941 and 1942—an average of 3% of the total energy transmitted per year was generated by steam. In 1943, 13% of the energy was generated by steam, and in 1944, 20%. This was caused primarily by the fact that 1944 was not as good a water year as 1943, and to the increase in load. The amount of energy generated in 1944 by steam would have been somewhat greater than this, except for the curtailment of light metals which made additional hydro energy available starting in the middle of 1944.

Due to the cooperation of the gas and oil industry of California, additional natural gas was made available starting in March, and continuing through the summer months, which saved approximately one million barrels of oil in addition to that saved by the curtailment of light metals. Due to the heavy load on the Long Beach steam plant for 1944, it was necessary to do considerable maintenance work to the furnaces and superheater tubes.

Approximately 150 miles of distribution lines were added during the year. Twenty-thousand new customers were connected to our lines and approximately 250,000 hp. of additional load was added, practically all of which was in war production plants. It is contemplated that we will build approximately 200 miles of rural distribution lines in 1945, at an estimated cost of approximately $400,000 including transformers, meter service, right of way, etc.

Additional transformer capacity in the amount of 20,000 kw. was added at Chino substation in 1944, which increased the interconnection capacity between the Edison company and San Diego Gas and Electric 50- and 60-cycle systems. The increased interchange capacity between the City of Los Angeles, Department of Water and Power, Wilmington substation, and the Southern California Edison's Long Beach steam plant of 100,000 kw. was completed in November 1944. This interconnection increases the interchange capacity between the 50- and 60-cycle systems in the Los Angeles area and greatly increases the flexibility of the operation between the two systems.

During 1944, 75,000 kw. of substation transformer capacity were added in addition to items mentioned above. —*N. B. Hinson, executive engineer.*

Turlock Irrigation District

CONTINUATION of wartime restrictions during 1944 resulted in very few lines being added to the district's electric system. No major projects were undertaken.

Prospects for 1945 include deferred line maintenance and additional substation capacity, if material conditions permit.—*L. H. Parker, electrical engineer.*

Colorado

Public Service of Colorado

ELECTRIC department construction for 1944 approximated $670,000, of which two-thirds was spent for distribution plant. Contemplated expenditures for 1945 are approximately $1,100,000, of which about 50% will be for distribution, 20% for plant betterments and the remainder for transmission improvements and miscellaneous construction.

Generation: No hydro or steam capacity was added in 1944, and none is contemplated for 1945.

Transmission: Two and one-half miles of double-circuit 110-kv. line were placed on a single-circuit basis during 1944, by adding sufficient towers and H frames on the same right-of-way to provide a separation into two single-circuit lines. The reconductoring and re-insulating of nine miles of 110-kv. line is planned for 1945, and the same job on an additional 33 miles will be done in 1946, if materials are available.

Distribution: Approximately 60 miles of distribution lines were constructed in 1944. This mileage will hold good for 1945 with some small increase. Distribution construction all will be of routine nature. It is expected that approximately $100,000 will be allocated for construction of distribution lines in rural areas.

Substations: Capitol Hill substation capacity was increased by 7,500 kva. in 1944. Additional substation capacity is planned for several distribution substations both inside and outside Denver in 1945.—*J. E. Loiseau, president and general manager.*

Southern Colorado Power

GENERATION: Nothing in the way of capital expenditures has been made on generating stations. We have made engineering plans for the contemplated installation of a new 15,000-kw. unit on our system, the work to start whenever war conditions make the necessary material available.

Transmission: No new transmission lines were constructed in 1944, or any extensive improvements made.

Distribution: No rebuilding of distribution lines was done in 1944, and none is contemplated for 1945. A total of about five miles of line was added in short extensions.

Substations: No additions to substations were made in 1944, and only 500 kva. in capacitors was added.

The 1945 construction budget was prepared in 1944 at a time when it appeared that the war in Europe would probably be over by the last of the year or the first part of 1945. On that account, it was prepared on the basis that all material required would be available. The total of the budget is $192,383. Principal items are as follows:

Substation additions and improvements	$26,097
Rural line construction	52,000
New business	37,183
Line type capacitors	5,500
Reconstruction of distribution lines	31,211
Improvements to transmission lines	9,800
Miscellaneous expenditures, steam plants	11,200

M. G. Lord, vice-president in charge of operations.

Colorado-Big Thompson, USBR

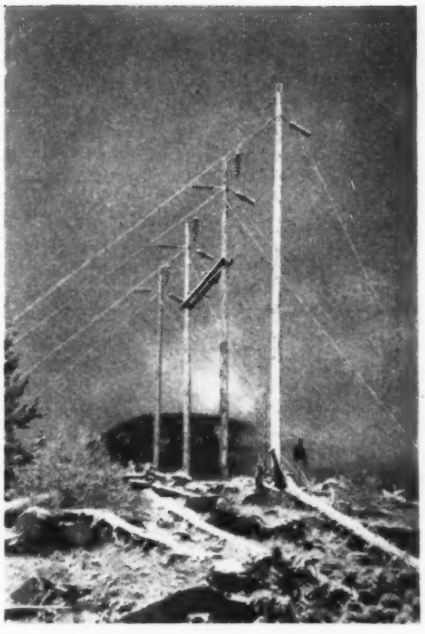
CONSTRUCTION of Shadow Mountain Dam and dikes was started during 1944, with earth fill being placed in dikes and cut-off trench under dam excavated and back filled. Most of the chute and stilling basin was completed by the end of 1944. Excavation of the Continental Divide tunnel was completed in June 1944, and 14,700 feet of invert lining were placed up to January 1, 1945.

Installation dates of the power features of this propect are indefinite and depend upon WPB action. A branch from the 115-kv. Greeley-Fort Morgan transmission line to Prospect Valley was completed in July 1944. The Prospect Valley unit substation equipment is scheduled for completion early in 1945. Funds available are $4,812,000.

Colorado Springs

AS has been the case for the last two years, only a small part of the money budgeted for capital additions has actually been spent. Of the $330,000 budgeted for 1944, only about $35,000 will actually have been spent. Approximately the same items are rebudgeted for 1945, the total figure being $375,000. However, due to the release of material by WPB, work is now under way on a 5,000-kw. additional unit in our steam plant which will cost about $250,000. The completion of this project will permit overhauling present units for the first time in four years.

The remainder of the budget is made up by items for a new hydro plant forebay, new feeder circuit ducts at the power plant, new street lighting installations and ordinary additions to the distribution system, their actual construction being largely contingent upon the war situation.—*F. H. Wiley, superintendent electric division.*



A major transmission project completed during 1944 was a 106-mile, 66-kv. wood pole line built by Idaho Power Co. to serve a mining district in the Yellow Pine area. Above is shown a dead-end structure in the line

Idaho

Boise-Anderson Ranch, USBR

CONSTRUCTION of Anderson Ranch Dam was continued on a restricted basis through the 1944 construction season. Work was concentrated on building up the upstream portion of the dam and on the intake for the outlet works. Shortages of manpower prevented the completion of the dam to a sufficient height to permit storage for the 1945 irrigation season. Work on the dam will be continued during 1945, but work on the power plant has been deferred indefinitely due to restriction by the War Production Board. The 1945 fiscal year appropriation is $4,300,000.

Idaho Power

GENERATION: No generating capacity has been added during the year 1944, nor is any contemplated at this time for the years 1945 and 1946.

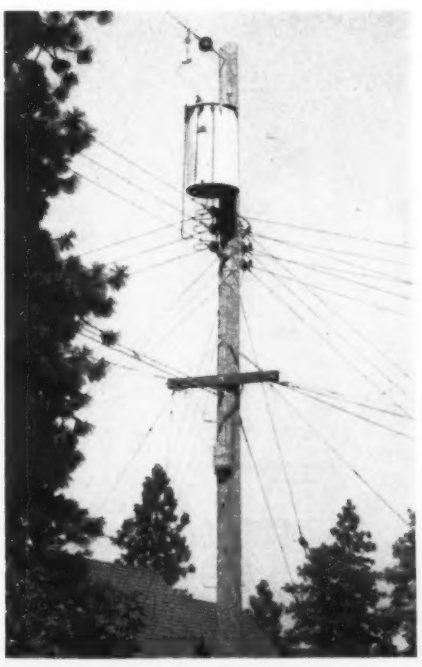
Transmission: Four and two-tenths miles of 66-kv. and .75 mile of 44-kv. transmission lines have been added during the year 1944. The 66-kv. line was constructed to serve a portion of the new territory recently taken over by Idaho Power Co. from West Coast Power Co. The .75 mile of 44-kv. line was added to give duplicate service to the Navy Ordnance plant near Pocatello, Idaho. No reconductoring or other significant improvements were made to existing transmission lines other than normal maintenance. Tentative plans are being considered for certain additional transmission lines to be constructed, possibly in 1946, but there is nothing certain at this time as to just when these lines will be built.

Distribution: Approximately 105 miles of distribution lines were added during the year 1944, and it is contemplated between 100 and 200 miles will be added during the year 1945. Some small amount of distribution improvements are under consideration, and are in the nature of raising the primary voltage from 4 kv. to 12.5 kv.

Substations: During 1944 one 1,200-kva. substation was added to serve the construction work at Anderson Ranch Dam, and a temporary 300-kva. substation was installed at Cascade. This latter will be replaced shortly after Jan. 1 with a 1,000-kva. transformer now on order. It is hoped to add one 3,750-kva., three-phase, substation transformer to the system during 1945 and to move several existing banks from one substation to another to provide needed additional capacity. It is further hoped to add a number of static capacitors at various points on the system during the year to relieve voltage and load conditions.

No major distribution changes or betterments are contemplated until war conditions ease or until load conditions make them imperative. Idaho Power Co. is taking care of such rural territory as meets war condition requirements at this time, but is planning no major projects until conditions change.—*B. C. Russell, general superintendent.*

Expenditures budgeted for distribution are one of the large items in every Western utility's future plans. Many systems plan to double their domestic consumption during the first five years following the war. Higher primary voltages to meet these greater loads is the solution most distribution engineers are turning to. The transformer pole shown below is on The Washington Water Power Co.'s new Spokane 13-kv. primary distribution system



Montana

For Peck Project, USBR

THE 20 MILES of 33-kv. transmission line from Frazer to Wolf Point, the 140 miles of 115-kv. transmission line from Fort Peck to Glendive, Mont., and the Glendive terminal substation, were under construction during 1944 and are expected to be completed by July 1945. Total amount allotted to this project for 1944 and 1945 is $899,475.

Nevada

Boulder Canyon Project, USBR

INSTALLATION of the 82,500-kva. generating unit, N-7, and its auxiliary equipment was completed and placed in operation during October 1944, making a total of twelve 82,500-kva. and one 40,000-kva. units in operation, in addition to two 3,000-kva. station service units. Installation of the

Bonneville's Total Energy Generated and Received, Total Energy Delivered and Energy Losses, Years 1943-1944

	1943 (kwh.)	1944* (kwh.)	Increase (kwh.)
Total energy generated and received	7,640,972,091	9,761,819,787	2,120,847,696
Total energy delivered	7,206,502,804	9,112,130,373	1,905,627,569
Energy losses	434,469,287	649,689,414	215,220,127

* Includes estimates for December 1944.

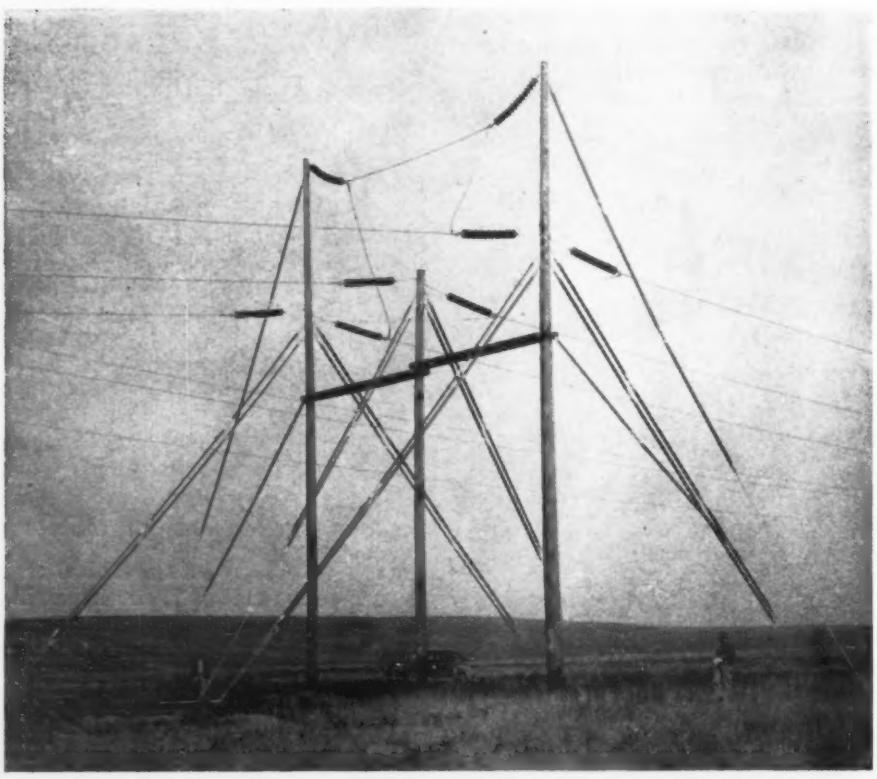
transfer bus tie to provide greater flexibility in utilizing the generator capacity was started in 1944, and was approximately 75% completed by the end of the year. Grouting of dam abutments and foundations was continued and channel improvements below the tunnel outlet portals were started. Modification of tunnel outlet portals and foundation and channel improvements will be continued during 1945. Funds available are $4,462,400.

Sierra Pacific Power

CONSTRUCTION activities in 1944 were minor, there being no specific item of any importance. There were no additions to generating capacity, transmission system or substations. About 15 miles of new distribution lines were built; approximately 2,000 kva. of capacitors were added on the distribution system.

The program for 1945 and 1946 contemplates no increase in generating capacity. One seven-mile, 60-kv. line into Reno is planned for 1945, together with a 10,000-kva. transformer bank, with automatic tap-changing equipment, at the Reno end of the line, to supplement the supply to the 23-kv. sub-transmission system in that area. One unit type substation of 2,000-kva. capacity will be added in Reno, to be connected to existing 23-kv. lines and 4-kv. feeders. The estimated additions and improvements to the distribution system total $155,000. There are no major rural extension projects planned for 1945. Rural extensions probably will not exceed ten miles at a cost of approximately $10,000. The total electric department budget approximates $230,000.—*V. D. Armstrong, engineer.*

Most notable Western transmission addition during the year was the 183-mile, 230-kv. second Grand Coulee—Covington line built by the Bonneville Power Administration. Shown here is one of the transposition structures in this line built largely with wood poles. Design was proved by full scale destruction tests on typical structures



New Mexico

Albuquerque G. & E.

NO capacity was added to our system in 1944, but we expect to add a boiler at Albuquerque station in 1945. Conversion was started on 35 miles of 22-kv. line to 44 kv. and work will be finished early in 1945. This involves approximately 10 miles of new 44-kv. line and changing over about 25 miles of present line. This change will enable us to take care of additional load south of Albuquerque, which our present 22-kv. line did not have the capacity to handle.

Due to government restrictions, very little addition was made to our distribution circuits during 1944. While we are hoping to build more during 1945, it will depend entirely on war and manpower conditions. Due to shortage in manpower, we have not been able to keep up our regular maintenance program.

We added no substation capacity during 1944, but will install an additional 1,000-kva. substation as soon as conversion is finished on our 22-kv. line south.—*Arthur Prager, president.*

Oregon

Bonneville Power Administration

MORE THAN 50% of all electric energy consumed during 1944 in the five Northwest states of Oregon, Washington, Idaho, Montana and Utah was supplied by the two large hydroelectric power plants at Bonneville and Grand Coulee dams, according to a year-end report on operation of the 2,700-mile Bonneville-Grand Coulee transmission system. During 1944 the Bonneville Power Administration delivered approximately nine billion kilowatt-hours to Pacific Northwest war industries, military establishments, public distribution agencies and private utility systems. This represented an increase of 30% over 1943 deliveries and brings total sales by the large federal transmission system during its first six years of operation to nearly 22 billion kilowatt-hours.

Gross revenues from sales of Bonneville-Grand Coulee power during 1944 totaled approximately $22,200,000, an increase of 36% over 1943 revenues. Gross revenues collected by the Bonneville Administration since its first sale of power in 1938 reached $52,000,000 with the close of 1944 business. Despite loss of approximately 300,000 kw. of load through recent cutbacks

in Pacific Northwest light metals production, power demands on the Bonneville-Grand Coulee system continued at a high level throughout 1944, and on Dec. 30, the system supplied a record peak load of 1,400,000 kw. Rated capacity of the two Columbia river plants is 1,316,000 kw.

One of the largest contributing factors to the 1944 record output from the Bonneville-Grand Coulee system was the steadily increasing demand for power by other Northwest utility systems. As the year 1944 drew to a close, other public and private utility systems in the Northwest power pool, which is comprised of the major utility systems in Oregon, Washington, Idaho, Montana and Utah, were taking as high as 600,000 kw. of Bonneville-Grand Coulee power to help meet their peak loads without consuming critical supplies of hog fuel and oil. Use of Bonneville-Coulee hydroelectric energy for displacing oil-fired steam energy saved more than 3,750,000 bbl. of oil during 1944 in the Seattle and Portland areas alone.

War industries continued to take a major share of all power generated at the Bonneville and Grand Coulee plants. During 1944 the Bonneville administration delivered 6,218,000,000 kwh. to Pacific Northwest war plants and military establishments. Deliveries to other BPA customers included 822,000,000 kwh. to publicly owned utilities, and 1,932,000,000 kwh. to private utility systems. Although Northwest aluminum production was cut back during the year, the region's five reduction plants utilized sufficient Bonneville-Coulee power to turn out approximately 500,000,000 lb. of this vital war metal—about one-third of the nation's total. Columbia river hydroelectric energy also was a major factor in the Pacific Northwest's record production of ships during 1944.

Other vital war materials produced in Pacific Northwest plants during 1944 through use of Columbia river power included approximately 17,000,000 lb. of magnesium and large quantities of calcium carbide, ferro-alloys and other critical war metals and chemicals.

New transmission and substation facilities added to the Bonneville-Grand Coulee system during 1944 included 197 miles of new high-voltage lines and 51,000 kva. in transformer capacity. Major addition to the system during 1944 was a second 183-mile, 230,000-volt transmission line from Grand Coulee Dam to Covington, Wash. This line, critically needed to relieve a transmission bottleneck in the Puget Sound area, was completed by Bonneville construction crews nearly one month ahead of schedule. At the end of 1944 the Bonneville-Grand Coulee transmission grid included 55 substations with a total transformer capacity of more than 2,200,000 kva., and more than 2,700 miles of high-voltage lines, including 1,238 miles of 230,000-volt lines and 1,102.5 miles of 115,000-volt circuits.

Combined rated capacity of the two big Columbia river hydroelectric plants was increased to 1,316,000 kw. with completion of the sixth 108,000-kw. generating unit at Grand Coulee on Feb. 11, 1944. This brought total rated capacity at Grand Coulee up to 798,000 kw.—*Nelson C. Hazeltine, director of information.*

Current and Future Power Development on Bureau of Reclamation Projects

Name of Project	State	River	Purpose (1)	Name of Plant	Year Initial Operation	Initial kw.	Initial Capacity Units	Ultimate kw.	Ultimate Capacity Units
Boise	Idaho	So. Fork Boise	F.C., Irr., P.	Anderson Ranch	(2)	27,000	2(3)	40,500	3(4)
Boulder Canyon	Ariz.-Nev.	Colorado	F.C., Irr., P.	Boulder	1936	(5)1,034,800	15(6)	1,322,300	19(7)
Deschutes (8)	Oregon	Crooked	P.	Cove	...	1,100	2(9)	2,600	3(10)
Central Valley	California	Sacramento	F.C., Irr., P.	Shasta	1944	154,000	4(11)	379,000	7(12)
Central Valley	California	Sacramento	F.C., Irr., P.	Keswick	(2)	75,000	3(13)	75,000	3(13)
Colorado-Big Thompson	Colorado	Big Thompson	Irr., P.	Mary's Lake	(2)	8,100	1 ..	8,100	1 ..
Colorado-Big Thompson	Colorado	Big Thompson	Irr., P.	Estes Park	(2)	45,000	3(14)	45,000	3(14)
Columbia Basin	Washington	Columbia	F.C., Irr., P.	Grand Coulee	1941	(5)818,000	10(15)	1,974,000	21(16)
Davis Dam	Ariz.-Nev.	Colorado	F.C., Irr., P.	Davis	(2)	180,000	4(17)	225,000	5(18)
Fort Peck (19)	Montana	Missouri	F.C., Irr., N., P.	Fort Peck	1943	35,000	1 ..	105,000	3(20)

(1) F.C. = Flood Control; Irr. = Irrigation; N. = Navigation; P = Power.
(2) Construction stopped for period of war. Initial operation date indefinite.
(3) 2—13,500 kw.
(4) 3—13,500 kw.
(5) As of Nov. 1, 1944.
(6) 12—82,500 kw., 1—40,000 kw., 2—2,400 kw.
(7) 15—82,500 kw., 2—40,000 kw., 2—2,400 kw.
(8) Cove power plant owned and operated by Pacific Power and Light Co. Bureau of Reclamation to purchase and install 1,500 kw., Unit (No. 3).
(9) 1—700 kw., 1—400 kw.
(10) 1—700 kw., 1—400 kw., 1—1,500 kw.
(11) 2— 75,000 kw., 2—2,000 kw.
(12) 5— 75,000 kw., 2—2,000 kw.
(13) 3— 25,000 kw.
(14) 3—15,000 kw.
(15) 6—108,000 kw., 2—75,000 kw., 2—10,000 kw.
(16) 18—108,000 kw., 3—10,000 kw.
(17) 4— 45,000 kw.
(18) 5— 45,000 kw.
(19) Fort Peck power plant operated by U. S. Army Engineers. Power distributed by Bureau of Reclamation.
(20) 3—35,000 kw.

Bonneville Dam, U. S. Army

INASMUCH as all construction at Bonneville was completed in December 1943, there is nothing further to report for work during 1944 and there is no change in the information given last year on this project.—*William D. Alexander, Lt. Col., Corps of Engineers, executive officer.*

California-Oregon Power

OUR company contemplates no additions to its generating system for the year 1945, nor were any added during 1944. During 1944 six miles of 115,000-kv., 3,000-kva. capacity transmission line were built to supply a new substation. Line 4 has been reinsulated. Transmission expenditures during 1944 amounted to about $140,000, and it is expected that the company will spend approximately $80,000 during 1945.

Thirty-six miles of new distribution lines were built in 1944. Transformer capacity added to the system amounted to 14,900 kva., and 270 kva. in capacitors was installed. Distribution plant expenditures for 1944 were $342,000, and the company probably will spend $251,000 in 1945. Substation improvements amounting to $100,000 were made in 1944, with $32,000 in improvements expected to be made during 1945. Total construction expenditures, which in 1944 amounted to $634,000, are expected to be about $445,000 in 1945.—*J. C. Boyle, vice-president and general manager.*

Deschutes Project, USBR

CONSTRUCTION of extension to the Cove power plant and installation of the 1,500-kw. Unit No. 3 and associated equipment has all been placed under contract, and it is expected that the unit and alterations to the Oromite and Redmond substations will be ready for operation by the end of 1945. The 1945 fiscal year appropriation for the entire Deschutes project, including irrigation features, is $2,250,000.

Eastern Oregon L. & P.

BECAUSE of the war and our geographic location, our program has been, and probably will be, held almost strictly to operation and maintenance. In eastern Oregon the year 1944 proved to be the dryest in the 40 years of record. The outlook for hydro generation in 1945 is definitely not as good as it was at this period last year. However, we hold with the optimists' view that 1945 will still prove better waterwise than 1944.

The total kilowatt-hour output increased 6% in 1944 over 1943. The peak in kilowatts increased 13%. The increase is attributed to the war activity of the lumber and woodworking mills in the area and the increased use of appliances on the part of residential customers. Gold mining and dredging operators predict, if the war goes well in Europe, resumption of gold mining in probably the month of May 1945. Our generation estimates reflect this optimism in the prediction of about a 10% increase for 1945.—*O. D. Lanning, chief engineer.*

Eugene Water Board

DURING 1944 activities of the Eugene Water Board were confined principally to the operation and maintenance of the system. The increase in business was not so great that large additions to the system were necessary during the year. New work is being postponed as much as possible. Plans are being made for the installation of 2,060 kva. of capacitors on the distribution system. No other major construction is planned for 1945.

Demands for the products of sawmills and farms has led to full community production, resulting in a small increase in population and electric consumption. Residential customers increased in number 3.5% during the year. The estimated kilowatt-hour per residential customer is 3,510. The number of residential customers using ranges is 57.5% and water heaters 31.0%. Kilowatt-hour consumption for all classes of customers is estimated to have increased 8.8%, and the system peak increased 2.0%, to 15,000 kw.—*J. W. McArthur, general superintendent-secretary.*

Mountain States Power

NO new generating or transmission facilities were added during 1944. Installation is under way, and will be completed early in 1945, of a 3,000-kw. steam turbine unit and boiler in the plant at Tillamook, Ore. Consideration is being given to new transmission facilities in 1945 but definite plans have not yet been decided upon. It is planned, however, to install an additional 20,000/26,667-kva. autotransformer at Springfield, Ore.

Static capacitors totaling 2,700 kva. were added to the Willamette Valley distribution system during 1944. Approximately 55 miles of distribution lines were added during the year. About 200 miles of rural distribution lines are in prospect for 1945. Due to manpower shortage, however, probably not more than about 75 miles of this can be built during the year, a considerable part of which will be to serve irrigation loads. The estimated cost for this construction is $60,000.—*G. McClellan, chief engineer.*

Northwestern Electric

GENERATION: No additional generating capacity was added in 1944 and none is contemplated for 1945.

Transmission: No new lines built. Condit-Camas 66-kv. line rebuild—completed, 22.33 miles; planned for 1945, ten miles; estimated cost, $40,000; remaining to be rebuilt, approximately 16 miles.

Camas-Vancouver 66-kv. line rebuild—completed in 1944, 1.6 miles; planned for 1945, 2.2 miles; estimated cost, $15,000; remaining to be rebuilt, 14.2 miles.

A carrier current communication circuit is planned between Portland and Spokane. The route of this channel will be from Portland to Condit, Wash., over the Northwestern Electric Co.'s 66-kv. line; thence to Pasco, Wash., over a 66-kv. line of the Pacific Power & Light Co.; thence to Spokane over a 110-kv. line of the Washington Water Power Co. Estimated cost of Northwestern Electric Co.'s end of communication channel, $12,000.

Distribution: Built in 1944, seven pole-miles; estimated to be built in 1945, ten pole-miles.

Substations:

Transformer capacity added	1944	1945
Evergreen Highlands (Wash.)	...	300
Washougal	1,500	...
E. Vancouver	...	2,550
Cully	...	8,500
Stark	...	5,000
Total owned	1,500	16,350
Leased—(Wash.)		
Hockinson	...	225
Pioneer	...	225
Ridgefield	...	150
Cherry Grove	1,500	...
Total	1,500	600
Grand total	3,000	16,950

Major distribution changes and betterments: none for 1945.

Rural expansion program: Most of our rural territory is already covered by lines, and extensions added will be minor in character.—*O. L. LeFever, general superintendent.*

Pacific Power & Light

APPROXIMATELY $956,000 was expended during 1944 for construction of new and improved facilities. Similar expenditures budgeted for 1945 total approximately $1,215,000.

During 1944 no major additions were made to generating facilities and none are contemplated in 1945. Two small sections of transmission line, totaling 11.68 miles, were completed in 1944. Both provided additional interconnections between the company's main power system and Bonneville Power Administration's system. Approximately $115,000 has been budgeted for new and improved transmission facilities in 1945. While this amount does not provide for an extension of transmission lines, two sections of 22-kv. transmission line in the company's Deschutes system will be reinsulated to provide for 66-kv. operation. Operating voltage of these lines is to be increased to transmit additional capacity being installed at the company's Cove generating station by the United States Department of Interior, Bureau of Reclamation. No major additions to transmission facilities are contemplated for 1946.

Distribution expenditures during 1944 totaled $598,000. Of this amount approximately $400,000 was expended for construction of facilities to serve loads not previously served which consisted primarily of war housing projects, rural and industrial loads necessary to the war effort and increased food production. Other expenditures were limited to such minor improvements of facilities, including increases in distribution substation capacities, as were necessary to provide for current load growth. During 1945 it is anticipated that expenditures for improvements and additions to the distribution system, including distribution substations, will again be limited to those necessary to provide service for customers engaged in war production, increased food production or essential civilian services as well as collateral load growth due to war activity in the service area. Due to relaxation of WPB limitations applicable to rural extensions and greater emphasis on increased food production, it is anticipated that such construction in 1945 will exceed that of 1944.

Transmission and distribution substation capacity added in 1944 approximated 35,000 kva. Of this total, 27,000 kva. was in connection with two interconnections with the Bonneville system. Present plans for 1945 contemplate a net increase of approximately

10,000 kva. in distribution substation capacity.

While the company's plans for 1945 contemplate an expansion of its rural program, such plans must necessarily be in accordance with current regulations as issued by WPB and limited to available materials and manpower. Under the circumstances, information concerning specific projects and estimated costs is not available at this time.—*H. H. Schoolfield, general superintendent.*

Portland General Electric

GENERATION: No additional capacity is planned for hydro or steam plants for 1945 and 1946.

Transmission: A 57-kv., 4/0 tie will be constructed between BPA Salem substation and PGE Co.'s West Salem substation. Approximate length two miles. Several 57-kv. lines require rebuilding on account of the physical condition of the poles. Existing 11-kv. tie capacities between stations "E" and "L" will be re-routed to provide a feed for the west side underground district which will be independent of the submarine river crossing between Station "L" and Jefferson substation.

Distribution: It is estimated that approximately 12,500 kva. in distribution capacity will be required for 1945. The distribution voltage in Portland is largely 4,150 volts; in Salem it is 2,400 volts. Our present plans are to continue these voltages. In outlying areas a start will be made in 1945 toward changing distribution voltage from 2,400 to 12,500Y.

Substations: Transformer additions in 1945 will be made primarily to take care of increases in domestic load. Such increases for system may total 12,500 kva. A portable substation is planned for emergency service and to facilitate maintenance work on existing distribution substations.

Major distribution changes and betterments: We have a number of oil circuit breakers on the high-tension system which are inadequate for service. Some of these should be replaced in 1945, if equipment is available. Also there are a number of manual substations which will be automatized as soon as necessary equipment can be obtained. We also have several stations which will be equipped with supervisory control.

Rural expansion program: The company is making every effort to extend its service to customers in rural areas which are not now served.

The foregoing is not too specific, but the uncertainties of the material situation for 1945 make it difficult to lay definite plans and to quote exact figures at this time.—*John Bankus, chief engineer.*

Utah

Telluride Power

OUR 1944 expenditures for property additions and improvements amounted to about $55,000. The 1945 expenditures likely will be somewhat less, due to reduced activity in some lines, notably mining. No additional generating capacity was installed in 1944, except that a new 1,200-kva. stator replaced a 1,000-kva. stator on one hydro unit.

We built 15 miles of 44-kv. line to interconnect our facilities with those of two municipalities, Mt. Pleasant and Ephraim, and to connect a lead-silver-zinc mine and a sawmill. No additions to the 44-kv. system are planned for 1945. The municipalities each built 300-kva. substations, the mine a 375-kva. and the sawmill a 159-kva. substation. A 600-kva., 44-kv./6.9-kv. substation was installed to take care of increased railroad and irrigation loads.

Approximately 15 miles of distribution lines were added to serve outlying farms. If WPB gives the "all clear" signal on rural line material and equipment, and poles are available, it is likely that we shall build about 25 miles of rural line in 1945, at a cost of about $25,000. When materials and labor become available, we shall take care of some deferred maintenance and make some enlargements, reconductor, and install automatic sectionalizing equipment, the total cost of these items being in the neighborhood of $100,000.

Recent governmental action permitting loyal Japs to move from the Topaz Relocation Center likely will reduce the load at that point. However, this is the only strictly war project we serve, and we are not concerned greatly about taking up slack when V-Day comes. We plan a very active sales campaign to increase our domestic load. During the year operating economies and increased business permitted a substantial rate reduction to domestic, municipal and commercial users.—*Paul P. Ashworth, general manager.*

Bonneville Dam and power house on the Columbia River, built by the U. S. Army Engineers, was fully completed in December of 1943. Total generating capacity here is 518,400 kw. Bonneville is the second largest plant feeding into the Pacific Northwest power pool with generating capacity of more than three and a third million kilowatts

Utah Power & Light

NO capacity was added to production plant in 1944 and none is scheduled for 1945. During 1944 three miles of 44-kv. line and 114 miles of distribution line were constructed and 2,000 kva. was added to substation capacity. Proposed construction for 1945 includes an additional 1,700 kva. in substation capacity and 25 miles of 44-kv. line. Construction of 380 miles of urban and rural distribution line also is contemplated. Budget appropriations for rural extension work in 1945 approximate $307,000. Ten or more projects in Utah and Idaho are being studied, but the recent change in prospects for availability of manpower and materials may necessitate postponement of some of the proposed work.—*T. A. Purton, chief engineer.*

Washington

Columbia Basin, USBR

INSTALLATION of the 103,000-kva. generating unit, L-4, and auxiliary equipment was completed and placed in operation during February 1944, making a total of six 103,000-kva. and two 75,000-kva. units in operation in addition to two 12,500-kva. station service units. Surveys and designs for irrigation features are in progress but no irrigation construction has been started. Funds available are $6,770,000.

Puget Sound P. & L.

DURING 1944 Puget Sound Power & Light Co. spent approximately $2,500,000 on construction work. It is estimated that during 1945 expenditures for construction work will total about $3,400,000. No generating capacity has been added at either hydro or steam generating plants during 1944 nor are any major additions to generating capacity contemplated for 1945. Minor replacements and improvements to various generating plants amounted to about $13,000 during 1944 and are estimated to be about $30,000 during 1945.

The improvement and replacement of existing distribution and transmission lines and substations was about $1,600,000 in 1944 and is expected to be $2,500,000 in 1945. There were eight miles of transmission line with an outdoor switching station constructed during 1944 at a cost of about $175,000. There will be about 35 miles of new transmission line with terminal facilities constructed during 1945 at a cost of about $345,000. There were approximately 83 miles of new distribution line constructed during 1944, and it is expected there will be approximately 80 miles of new distribution line constructed in 1945.

There were six new distribution substations built in 1944, having a total of 24,500 kva. capacity, and there were 30,000 kva. of transformer capacity added to the system at various distribution substations throughout the territory. The 1945 plans call for the construction of six new distribution substations totaling about 10,700 kva. of transformer capacity. There were approximately 36,000 kva. of distribution line transformers and 500 kva. of static capacitors added to the system during 1944. An estimated total of 1,300 kva. of static capacitors will be installed in 1945. A 2,500-kva. mobile substation was placed in operation in 1944. The number of customers increased 8,353 during the year 1944.

A 30,000-kva. transformer bank, equipped with forced-air cooling for 40,000 kva., was installed at the Beverly Park substation, replacing a smaller bank. The 30,000-kva. synchronous condenser at the Canal substation was placed in operation in 1944. Also during 1944 a 15,000-kva., 55-kv. substation and line were constructed for an interconnection with the British Columbia Electric Railway Co., Ltd.

It is planned to construct three new operating service buildings during 1945, estimated to cost about $90,000. —*Frank McLaughlin, president.*

Shown here is the site of the proposed Umatilla Dam, which probably will be the next step in the long-range program of development in the Columbia River Basin. Primary purpose of the Umatilla project is improvement of navigation on the Columbia. Preliminary plans call for installation of a navigation lock and power facilities for development of from 630,000 kw. to 690,000 kw. of hydroelectric power, depending upon the height of the dam

Seattle City Light

NO generating capacity was added during the past year. Construction of the second step of Ross Dam has progressed slowly due to shortage of labor. This project will supply storage sufficient to double the firm capability of the present Diablo and Gorge plants during most critical stream flow conditions. The necessity of driving two 24-ft. power tunnels for the future power plant before proceeding with the placement of concrete has revised the construction schedule so that completion is not expected until early in 1946.

Although no additions were made to the high-voltage transmission system, the double circuit 220-kv. steel tower line between the South receiving substation and the Skagit River plants was relocated in the vicinity of the City of Renton. The relocation added about 3.2 miles to the total length of the line. About seven miles of 26-kv. station intertie lines were completed during the year and it is expected that about the same amount of this type of construction will be completed during 1945.

The new Magnolia substation of 6,000 kva. was completed early in 1944 and in addition about 22,500-kva. capacity was added to existing distribution substations. A new bank of 220/26-kv. transformers of 60,000-kva. capacity is being installed at the South receiving substation at the present time with completion scheduled for January 1945. Construction of the new Central substation for serving the underground system has been under way for several weeks and completion is anticipated in the first part of 1945. This station will have an initial capacity of 13,000 kva. with eight 4,330-volt underground network feeders. There will also be 4,500 kw. of rectifier capacity for supplying 600-volt d-c service to the transit system. No synchronous condenser capacity and very little static capacitor capacity has been added.

Studies are about completed and plans are being made for the installation of 30,000 kva. of 4,330-volt primary distribution network in 1945. Availability of materials will, of course, regulate the amount of this work that will be completed during the year.

Maintenance deferred on account of material shortages will be taken care of as materials become available.

The amount of this type of work, it is believed, will be very limited during 1945.—*E. R. Hoffman, superintendent of lighting.*

Tacoma City Light

TACOMA'S two-dam 90,000-kw. Second Nisqually development now nears completion after months of costly delay due to the area's critical labor situation. This project will increase the city's total generation to 238,000 kw., of which 204,000 is hydro, and 34,000 is normally cold steam standby for emergency use. With the completion of this new development, Tacoma City Light will increase its normal hydro generation to 850,000,000 kwh. annually, and will have in excess of 200,000,000 kwh. available annually from steam. Additional energy is available to Tacoma through interconnections with Seattle City Light and the Bonneville-Coulee system.

During the year Tacoma installed an additional 20,000 kva. forced-air outdoor type synchronous condenser, and added 10,000 kva. of 50/13-kv. distribution substation capacity. The initial portion of a rather extensive telemetering and load control installation will be completed early in 1945.

Tacoma City Light's Second Nisqually project, now well along toward completion, will add 90,000 kw. of hydro generating capacity to serve Tacoma's growing needs. Alder Dam shown above is 330-ft. high and will impound 210, 800 acre-ft. of water. Power house will contain two 25,000-kw. units. A new diversion dam for La Grande power house downstream from Alder Dam and an additional 40,000-kw. unit are part of the new Nisqually project

Transmission was increased by 9.5 miles of 110-kv. line having a capacity of 80 megawatts which provides a second line from the La Grande hydro plant. In addition, 115 miles of 50-kv. line was reconductored. Planned for 1945-6 is 10 miles of 110-kv. line from the 65th St. to the Pearl St. substation. During the past year, the 65th St. substation and switching station was completed. Distribution addition totaled 24 miles of line and about a like amount will be built during 1945. Substation capacity added last year was 10,000 kva., 52/13.8 kv., and for 1945 distribution substation betterments will total $150,000.

The system gross load for 1944 will approximate 816,000,000 kwh., with a 60-minute peak of 153,000 kw. This is an increase of about 3% in energy and 4.3% in peak over 1943.—*Verne Kent, superintendent of light division.*

Washington Water Power

A CONSTRUCTION budget of slightly more than $1,000,000 has been set up for 1945 as compared with 1944 expenditures of approximately $680,000. Construction work carried on during 1944 consisted of some replacement of transmission and distribution facilities and the completion of the installation of telemetering equipment for our interconnected pool operations.

During 1944 our old heat plant line, 2.85 miles in length and which was built in 1906, was replaced by a new line which followed the Northern Pacific right-of-way, and the old line, which followed a route through a residential district, was dismantled. Rehabilitation work was carried on on 36 miles of the 60-kv. Pend Oreille line and included installation of new insulators, new cross arms, and pole stubs as required. Some 92 miles of distribution line on the system were built during 1944. Distribution rebuilding included a 30-block project in Spokane.

The Magnesite substation, serving an important war industry, was rebuilt at a new location with a capacity of 4,500 kva. Major increases in transformer capacity included the installation of a 10,000-kva. bank at Post Falls, Idaho, to handle the increased load at the Farragut Naval Training Station and the installation of a 10,000-kva. bank at the East Side substation in Spokane.

Plans have been completed for installation of carrier-current telephone equipment to facilitate communication between our system and the coast, and the installation of relaying equipment on our 110-kv. transmission system.

Plans called for the rebuilding of the 36-mile Pend Oreille line during 1945 and the new line will be spaced for 110-kv. operation. Two and one-half miles of 110-kv. line will be built adjacent to the Ross Park substation and plans are still being considered for the construction of a transmission line to serve the Metaline mining district.

We contemplate the construction of a new substation at Ross Park of 25,000-kva. capacity and which will operate at 110,000/13,000 volts. First steps will be taken this year for relocation of the East Side substation. In Spokane it is planned to replace 122 blocks of distribution system, which will operate at 13,000 volts instead of 2,300 volts as previously. It is also planned to replace the irrigation circuits in the Spokane Valley. In the Spokane underground system, it is planned to change three vaults from 4,000-volt to 13,000-volt operation and to install 5,900 ft. of 13,000-volt feeder cable. Plans have been drawn to build 9,000 ft. of 13,000-volt line to complete a ring feeder and improve service at Lewiston, Idaho, and to increase the capacity of a substation there from 1,000 kva. to 4,000 kva. A 100-amp. 13,000-volt step voltage regulator will be installed near Quincy, Wash. It is planned to replace the distribution system at Creston, Wash., and to increase the capacity of the Tonasket substation from 450 to 1,500 kva. At Coeur d'Alene, Idaho, 58 blocks of distribution system will be replaced and changed from 4,000 volts to 13,000 volts. A one-half-mile section of 13,000-volt line and a 1,000-kva. substation will be installed to serve the Rathdrum irrigation project.

In general, construction activities will be guided by the war situation and the availability of materials, and every effort will be made to maintain and improve service during the year.—*J. E. E. Royer, vice-president and general manager.*

Crowds of prospects for appliances await the day when they can shop at dealers' stores again, as they did at Grabe's Electric Shop in Tucson at its anniversary sale back before war

COMMERCIAL people are optimists, as a rule. They build business better if they are. Imagine a pessimist trying to sell anything! It is not surprising then that the commercial people in this electrical industry, as well as in all industries, had the war "in the bag" and appliances back on the production line by the end of 1944. For a while it looked promising. Then came the costly dose of cold reality, known as the Belgian Bulge, and hopes for early civilian goods production were chilled.

Now, at this writing, the Russians are closing in from the East and prospects are brighter again. Whether or not there will be much production of civilian goods, particularly electrical equipment—appliances, wiring materials, machinery and devices—in 1945 is still in doubt. But preparations for the return of business in these fields are in excellent shape to take full advantage of any break the situation affords.

In the past the figures of the previous year's accomplishment were used to provide a measure of the expected market for the year ahead. In 1944 there were no such yardsticks. Sales were limited to resale of second hand or limited (and often restricted and delayed) order taking for frozen or war released stocks. But these provide no index of what may be expected. Likewise, in many utilities, who usually can be depended upon to make available the results of their own market studies for their territories, manpower shortage and heavy responsibilities in war effort fields have prevented the research customary.

However several utilities, both private and municipal, have made surveys or studies in representative areas. From these studies, the results of which are reported in the following pages, reasonably accurate estimates can be drawn for the adjacent territories. From these data a measure of the future can be taken and, when the cloth is available, the market of the future can be cut and sewed up.

These annual reviews are a joint undertaking of both ELECTRICAL WEST and *Electrical Merchandising* for the eleven Western states, with the fine cooperation of the utilities of the region. Thanks to them and to the great number of them responding, the entire industry is afforded an intimate statistical picture of its potential opportunity. The wise dealer, contractor,

wholesaler and manufacturer will gratefully take these data and digest them into his own appraisals of potential business for his own territory. ELECTRICAL WEST acknowledges its gratitude to the many utilities, and particularly to the men and women, who have assisted in the surveys and the compilation of data which can be thus made available here.

In many instances, because ELECTRICAL WEST goes to press with its statistical and review number later than *Electrical Merchandising*, subsequent corrections on total yearly figures have been furnished by many of the companies. In particular these will be found in number of customers and in average annual kilowatt-hour consumption. Likewise the following reports, by company or utility territories, are more detailed in many cases and likewise include the adequate wiring, lighting, commercial and industrial and agricultural plans for each.

Kilowatt-hour consumption averages climb to new highs in the West this year. Nearly all utilities now top 1,000, many 2,000 and the group with over 3,000 is increasing. What this means to utilities is load, but interpreted for dealers it means acceptance and a ready market for electrical devices, and for contractors it means that the old wiring will have to be bolstered with new and larger copper to serve such loads. It is also significant that virtually all reports mention the promotion of adequate wiring as a vital necessity and that most of them plan to do something about it.

Estimates of accumulated appliance demands almost appear fantastic until it is remembered that the appliances in use are all at least five years old, that every old appliance that could be made to operate has been resurrected, and that many of them are receiving severe and unusual use which will hasten the day of their necessary replacement. Marriages, too, have been at an all-time high, and after the war the number of new homes to be established offers a tremendous market.

In many of the reports, mention is made of the housing that will have to be built to unscramble the doubled up, crowded and temporary war-housed populations. Very little loss of the new population which has flooded the West seems to be expected. This means that better housing for many will be in demand. The unpleasant alternative is the retention of unsightly and unsafe temporary boxlike housing tenements. Such housing means a market for the electrical contractors and manufacturers and distributors of wiring materials. Commercial rehabilitation will enlarge that market.

Everyone can find opportunity in the figures and facts that follow.

Arizona

Central Arizona L. & P.

A COOPERATIVE program to assist dealers, since this company does not plan to do merchandising after the war, and regular programmed promotions following national campaigns are in the plans of Central Arizona Light & Power Co. No determination has been made yet as to particular emphasis on new or old appliances or load builders. The company plans adequate wiring promotion, lighting, industrial and commercial, and agricultural programs of mail advertising and personal follow-up.

The number of sales employees given in the table refers to residential sales, not to the entire staff. Advertising during the past year has been along all lines and will continue for the duration.

In the saturation percentages the 40% for IES type of lamps should be interpreted to mean that 40% of the homes served have one or more of such lamps.

It is anticipated that the postwar trend in population will be increasing, with number of domestic customers and kilowatt-hour consumption following the same trend. About 30% of present load is war load. Population increase has been 25%.

Tucson E. L. & P.

APPROXIMATELY from 25 to 30% of the kilowatt-hour sales of Tucson Electric Light & Power Co. is now war load. Population has increased about 30% and may decrease after the war. Consumption is expected to increase with the availability of appliances and equipment.

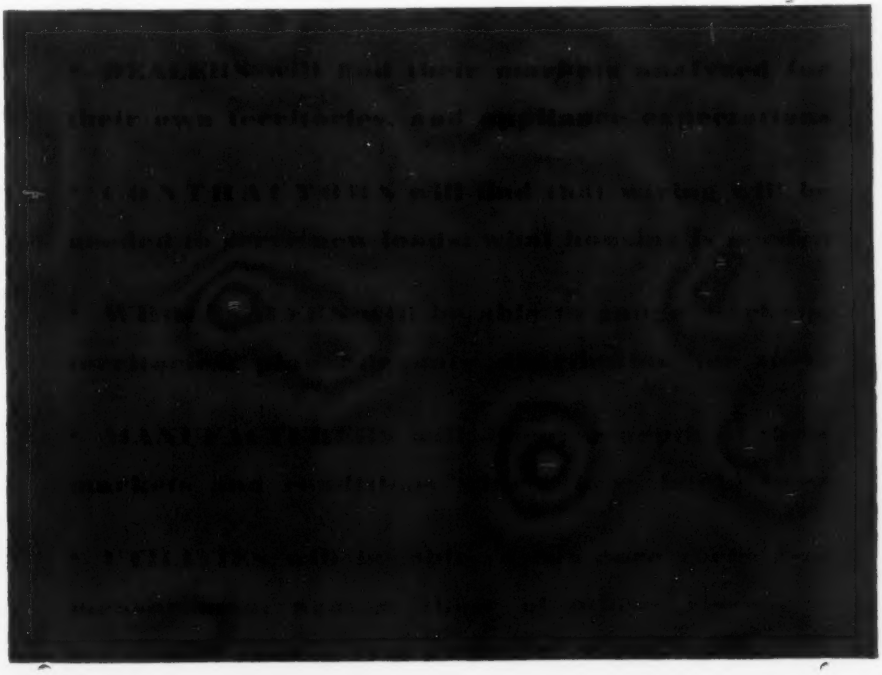
Before the war Tucson's climate was the major source of new population growth, for health seekers flocked there during winter months. The war has brought several war industries, some of which may be converted for permanent operation. Travel once restored, Tucson will again attract its tourists. In a sense the war may have opened new opportunity there.

California

City of Alameda

COOPERATION with dealers and sharing of advertising costs and free range wiring are contemplated by the Department of Public Utilities for the city of Alameda, Calif., according to G. A. Baxter, secretary. Electric ranges and water heaters will be emphasized though the utility does not plan to merchandise itself. To retain as much of the industrial load as possible, cooperation with the Chamber of Commerce will seek to encourage industries to come to that city. About 70% of present load is war load.

If federal housing erected in the city to house war workers is dismantled, population which has increased 100%, will decrease about 25%. The average use per family, however, is expected to increase. Figures in the tables for residential are for single family dwellings, many of which have rooms rented out to Army, Navy or war plant people. In addition to the 1,119 commercial customers listed, there are 298 power, 55 com-



CUSTOMERS AND CONSUMPTION

UTILITY TERRITORY	Average annual kwh. consumption—Residential 1944	1943	1942	1941	1940	Residential Customers 1944	1942	Farm Customers 1944	1943	Commercial Customers 1944	1943	Total all 1944 Customers
Alameda, City of	1,334	1,256	1,201	1,044	1,080	12,375	13,000	...	...	1,119	1,130	13,972
B. C. Elec. Ry., Vancouver	1,080	1,025	932	926	909	87,184	86,700	17,999	17,900	16,156	15,650	121,339
B. C. Elec. Ry., Victoria	1,062	952	869	850	839	20,000	23,270	4,000	4,263	3,600	3,460	28,900
Calif. Elec. Power	1,300	1,259**	1,328	1,314	1,349	26,174	22,700	3,200	950	4,387	4,200	31,798
Calif.-Oregon Power	3,003	2,909	2,706	2,558	2,385	29,654	28,800	3,441	3,631	6,725	6,495	40,411
Central Ariz. L. & P.	1,090	1,070	1,140	1,088	1,124	32,214	...	1,200	...	5,899	...	38,303
Coast Counties G. & E.	943	871	...	...	...	11,482	...	12,362	...	4,066	...	29,524
Colorado Springs	1,050	1,002	...	...	...	13,568	...	...	...	2,970	...	16,562
Eastern Ore. L. & P.	1,494	1,413	1,305	1,167	1,056	5,886	5,751	943	894	1,088	1,024	7,917
El Paso Elec.	...	1,315	1,259	1,285	1,279	...	28,903	...	1,750	...	4,095	35,000
Eugene Water Bd.	3,300	3,269	2,993	2,752	2,602	9,900	9,680†	...	...	1,810*	1,695*	11,710
Glendale, City of	1,260	1,162	1,084	1,112	1,032	27,250	27,035	...	...	5,150	5,025	32,400
Hawaiian Elec.	1,637	1,567	1,389	1,411	1,244	45,997	45,000	...	...	...	...	56,147
Idaho Power Co.	2,450	2,361	2,137	2,018	1,946	43,500	42,450	19,500	19,100	10,200	11,135	74,000
Imperial Irrig. Dist.	2,078	2,078	...	...	...	10,866	...	5,823	...	2,475	...	20,026
Los Angeles Dept. W. & P.	1,144	1,023	977	998	954	462,600	457,848	...	...	87,766	81,423	557,607
Modesto Irrig. Dist.	2,075	2,000	...	...	...	5,500	...	6,000	...	1,210	...	13,600
Montana Power	1,116	1,081	...	...	...	71,203	...	3,115	...	15,492	...	91,643
Mountain States Power	1,770	1,684	1,534	1,410	1,362	48,740	47,000	8,750	8,500	8,658	8,300	69,719
New Mexico Power	720	600	...	...	...	4,100	...	300	...	552	...	4,952
Northwestern Elec.	2,950	2,734	2,180	1,720	1,529	42,459†	41,617†	...	...	6,747	6,272	50,290
Pacific Gas & Elec.	1,227	1,137	1,068	1,063	1,024	646,800	812,000†	183,900	...	139,000	157,500*	1,039,400
Pacific Power & Light	1,978	1,895	1,765	1,802	1,689	61,318	58,640	17,997	17,350	13,287	17,350	93,827
Pasadena, City of	1,150	1,080	1,050	1,027	1,023	29,166	29,264	...	...	3,366	4,478	32,532
Portland Gen. Elec.	2,373	2,218	1,935	1,698	1,518	91,389	86,354	50,672	51,000	14,375	13,319	157,731
Provo, City of	1,368	1,374	...	...	...	5,218	...	...	...	...	...	6,335
Public Service of Colo.	901	857	781	781	749	119,472	118,350	5,422	5,810	17,672	16,635	149,520
Puget Sound P. & L.	2,360	2,262	1,997	1,716	1,511	216,000†	208,000†	...	...	24,500	23,000*	240,500
San Diego G. & E.	1,226	1,135	1,074	1,135	1,994	90,617	99,952†	18,390	...	16,342	14,482	130,691
Seattle City Light	3,246	2,993	2,612	2,062	1,703	88,132	88,000	...	...	11,120	11,000	100,156
Sheridan Co. Elec.	825	803	...	748	747	3,735	3,055	425	723	570	472	4,626
Sierra Pacific Power	2,066	1,856	1,738	1,682	1,591	13,957†	13,361†	...	...	2,333	2,237	16,420
So. Calif. Edison	1,146	1,070	983	1,005	984	524,658	482,435	25,993	41,113‡	106,768	85,726	645,877
So. Colorado Power	1,124	1,047	991	975	932	22,589	22,647	1,760	1,834	2,936	2,903	28,436
Tacoma, City of	3,500	3,402	2,852	2,435	2,185	38,255	38,752	...	...	3,695	3,727	43,199
Telluride Power	800	800	...	...	...	4,408	...	1,116	...	603	...	6,127
Trinidad El. Tr. Ry. & G.	...	661	638	...	615	...	4,493	...	700	...	1,235	6,500
Tuscon G. E. L. & P.	1,227	1,137	...	1,014	987	9,900	9,601	7,900	7,248	1,800	2,887	20,880
Uintah P. & L.	800	752	800	...	585	525	525	141	150	203	220	904
Utah Power & Light	1,386	1,328	1,243	1,246	1,212	119,283†	124,331‡	...	...	12,028	13,716	133,402
Vallejo E. L. & P.	...	1,048	1,024	...	...	...	11,360	...	...	...	1,155	12,500
Washington Water Power	2,871	2,708	2,369	2,348	2,284	67,600	70,356	15,200	12,898	12,120	11,936	97,700

* Includes industrial. † Includes farm customers. ** Excludes Imperial and Coachella Valley systems to Imperial Irrigation Dist., Oct. 15, 1943.
‡ Included farm power customers.

mercial light and power and 125 municipal customers.

Advertising, unless merchandise is again made available, will be institutional, care and use, postwar, and war effort copy as it has been during 1944. When merchandise is available, it will be focused on dealer help.

California Electric Power

WITH a program competitive but cooperative, California Electric Power Corp. plans to merchandise, and special emphasis will be put on home freezers, radio, electric clothes dryers and a crew of special appliance service men will be maintained. The wiring program of the Pacific Coast Electrical Assn. will be promoted, "because there is no territory anywhere that has adequate wiring. Adequacy changes with new uses and appliances," according to Dudley Wheelock, general commercial manager.

Active lighting promotion in commercial and industrial fields, with at least two full-time men, is contemplated, and the company may add domestic lighting crew later if a promotional vehicle is available. In the industrial field, there will be two or three men active immediately postwar. The company now has one man dedicated exclusively to agricultural customers and will add one or more after the war depending on conditions prevailing at the time. The home service women reduction in the table is due to loss of territory and not to a reduction in that program.

Population is up about 20% due to the war and may drop to 10% and domestic customers the same proportion. As soon as appliances are available it is felt kilowatt-hour consumption will go up too. Present war loads represent about 40% of kilowatt-hour sales.

Since rural is a relative term, no figures as to number of rural customers is kept, but those in the table represent farms. The 1943 kwh. figure of 1,259 excludes Imperial and Coachella valley systems sold to the Imperial Irrigation District in October 1943. Advertising in 1945 will continue to be about 25% institutional, 50% care and use and 25% war effort unless merchandise is released.

"We have been attempting to make some studies of the potential appliance market in our territory," says W. S. Fleming, sales manager, "in order properly to plan our merchandising activities. We have some population figures, 94,600 for the entire system, but they have been obtained by multiplying the average number of domestic meters in each area by 3.5. From all indications these figures are reasonably close.

"From several national studies of potential appliance demand, applied to our population, neither scaling up nor down, because of any local condition, saturation, etc., we estimate a potential market five years after V-day of around 9,000 refrigerators, 3,000 ranges, 5,000 washers, 27,500 radios, 2,000 water heaters and a miscellany of small appliances of indeterminate number. These figures are startling even to us, but as I say, from checking with several national surveys, it appears that we are about in line with what is anticipated throughout the country."

Coast Counties G. & E.

OUR small size and general conformity with adjacent towns covered by Pacific Gas and Electric Co. makes our portion of the state-wide picture unimportant, we feel. We do not expect much change in population figures after the war and, since we have no special war industries, we do not see where there will be any great recession in business or industry. Our

money crop in Santa Cruz is secured from scenery and recreational facilities; Watsonville depends upon lettuce, apples and food processing; Gilroy and Hollister on prunes, apricots, tomatoes, lettuce and food processing. The amount of land under cultivation does not vary much from year to year, so our prosperity is mainly affected by crop prices.

We plan to do some merchandising after the war but our dealer set up will be cooperative, as it was prewar. In lighting we plan intensive promotion and for domestic lighting may have some house-to-house trailer units in the field. We plan to use the Westinghouse "Electrical Living in 194X" wiring promotion program, for we feel there is need for it. To make wide use of new appliances possible and to get many older houses in this area rewired, we feel this need.

Our advertising in 1945 will be the same as in 1944, with the addition of postwar and adequate wiring emphasis.—*H. W. Edmund, vice-president and general manager.*

City of Glendale

IF ARCHITECTS, contractors, builders and wiremen would insist upon adequate wiring, the home owner would have a more complete residence, and fewer alterations would be necessary in wiring. The most urgent program is for the installation of the necessary wiring, switch, conduit and cable for both ranges and water heaters.

Our own program is not yet determined in any of the fields. There has been an increase of 15% in population and domestic customers due to the war, but a slight decrease may be experienced after the war in both. Likewise there may be a slight decrease in kwh. consumption until new merchandise is available.—*George D. Hastings, commercial agent.*

Imperial Irrigation District

A POLICY of no merchandising but cooperative advertising and promotion of dealer sales, lighting, commercial and industrial and agricultural power usage will be carried on by the Imperial Irrigation District, according to Stevens H. Harris, commercial power superintendent. Empasis will also be given home freezer sales.

Little change in population has been felt compared with prewar, nor is much change expected after the war. Consumption however should go upward due to increase in saturation of appliances. Only 5% of present kilowatt-hour consumption can be called war load.

In addition to the estimates of accumulated demand in the table, this utility notes a demand for 500 desert coolers, despite a 69.6% present saturation, and 500 home freezers. Advertising plans are indefinite because of the uncertainty of the appliance supply.

Los Angeles Dept. of W. & P.

PROMOTIONAL efforts will be directed, in Los Angeles Department of Water & Power postwar promotions, to kitchen and laundry equipment, ranges and, more particularly, water heaters. The department will not merchandise. Its dealer relations units will advise with and offer the department's cooperative policies, market studies, dealers' salesmen's training, store layouts, kitchen layouts for customers, wiring and plumbing reimbursement policy, cooperative advertising, home service calls, major appliance service, appliance displays, prospect distribution and utility and dealer sales programs.

Aggressive promotion of commercial and industrial lighting will be carried on with emphasis on window lighting, interior commercial and office lighting, service stations, flood and decorative lighting, and consideration is being given to modernizing street lighting.

Home owners, builders and architects must be advised of the value and importance of adequate wiring in a modern home; encouraged to include adequate wiring specifications as a part of the plans and specifications of the home. In our area a relatively high percentage of homes are built by speculative builders. Therefore, an aggressive promotion of adequate wiring will be carried on through personal calls on owners, builders, architects, electrical contractors and lending institutions. By direct-mail advertising to prospective home builders and by offering sales helps to speculative builders, the market for this will also be stimulated.

Direct-mail advertising to architects, commercial and industrial establishments and follow-up with personal calls by specialists and power consultants will be carried on to salvage as much industrial and to convert as much to commercial load as possible. We have no agricultural load.

Advertising will be devoted, in 1945, principally to the electric kitchen and laundry, with support to the war effort through encouraging the purchase and holding of war bonds. Major appliances will be featured as they become available. Aggressive promotion of major appliances and adequate wiring will be made in advertising when appliances are available and residential construction is permitted.

Population has been increasing according to trend since 1938: an approximate increase of 46,000 per year. After the war, the same trend average will bring increases of approximately 67,000 per year.

Studies are being made of the probable postwar markets for major appliances, probable increase in residential consumers, new building construction, and average kilowatt-hour consumption per residential consumer. These studies are based on the assumption that the European war will end in March of 1945 and the Pacific war in March of 1947.

Population is based on the growth from 1938 to date. A trend curve was developed and estimates were made for a ten-year period from 1945 to 1955. Estimates of the number of residential consumers for the same period were developed from records and calculations based on the ratio of consumers to total population.

Year	Estimated L. A. City Population (1,000)	Estimated Total Resdl. Consumers on Dept. System	Estimated Increase in Residential Consumers
1944-45	1,770	471,000	
1945-46	1,800	485,000	14,000
1946-47	1,830	500,000	15,000
1947-48	1,880	525,000	25,000
1948-49	1,960	555,000	30,000
1949-50	2,040	585,000	30,000
1950-51	2,120	610,000	25,000
1951-52	2,200	635,000	25,000
1952-53	2,280	660,000	25,000
1953-54	2,360	685,000	25,000
1954-55	2,440	710,000	25,000

The housing need or new construction market is indicated by the increase in residential consumers. A considerable amount of building alteration and modernization is expected in the immediate postwar period; however, owing to the past housing shortage in this area, most of the conversion from single- to multiple-family dwellings is now completed and the increase in residential consumers will be in new construction. Past records indicate that the volume of new construction in our service area was approximately 3% of the national figure prewar. Many sources agree that the national residential construction will reach approximately 900,000 to 1,000,000 units per year postwar.

The average annual kilowatt-hour consumption per residential consumer shows a gradual increase and was only slightly affected by the 1933 depression and the present war conditions. If this is increased in proportion to past gains, it would produce an annual kilowatt-hour consumption of approximately 1,300 kwh. in 1950 and 1,500 kwh. in 1955. We consider this an absolute minimum, however, and

Measurements of the Market—Saturation and Accumulated Demand

UTILITY TERRITORY	Estimated Present Saturation—Per Cent								Estimated Accumulated Demand in Units, Immediately Postwar								Total for all, dollar volume
	Range	Water-H.	Refrig.	Washer	Ironer	Radio	Air-h.	IES	Other	Ranges	Water-H.	Refrig.	Washers	Ironers	Radio	Air-heat	Others	
Alameda, City of	20.0	75.0	65	75	1	80	2	10	: :	300	25	700	1,000	100	3,000	200	: :	217,500
B. C. Elec. Ry., Vancouver	15.0	2.5	20	45	3	85	: :	: :	: :	10,000†	5,000†	25,000†	20,000†	5,000†	50,000†	: :	: :	15,000,000
B. C. Elec. Ry., Victoria	13.0	4.0	: :	: :	: :	: :	: :	: :	: :	500	300	1,200	: :	: :	: :	: :	: :	: :
California Electric Power	20.0	10.0	: :	70	10	95	5	50	: :	3,000†	2,000†	9,000†	5,000†	500	27,500†	250	: :	4,000,000
California-Oregon Power	48.5	30.9	: :	: :	: :	: :	: :	: :	: :	3,000	4,000	4,000	4,000	1,000	6,000	1,500	irons 6,000‡	1,949,000
Central Arizona L. & P.	6.0	2.5	66	60	: :	90	: :	40*	: :	300	150	5,000	3,000	300	10,000	: :	: :	2,329,600
Coast Counties G. & E.	10.0	5.0	75	60	5	99	50*	60	: :	123	60	370	675	125	1,350	550	: :	319,475
Eastern Oregon Lt. & P.	40.0	15.0	80	85	10	95	5	90	: :	1,000	1,000	1,700	1,700	350	1,700	: :	: :	: :
Eugene Water Bd.	57.5	30.0	: :	: :	: :	: :	: :	: :	: :	1,000	500	: :	: :	: :	: :	: :	: :	: :
Glendale, City of	16.0	1.0	65	: :	: :	: :	: :	: :	: :	500	150	1,000	: :	1,000	7,500	: :	: :	6,500,000
Hawaiian Electric	21.0	17.0	79	: :	: :	: :	: :	: :	: :	5,000	4,000	7,500	7,500	1,000	7,500	: :	: :	5,402,000
Idaho Power	60.2	27.8	75	85	: 4	95	15	75	: :	6,431	3,071	11,487	7,907	500	14,657	3,000	500‡ 500§	506,190
Imperial Irrig. Dist.	35.4	19.3	71	69	6	85	5	10	69.6*	334	167	500	834	84	834	167	: :	: :
Los Angeles Dept. W. & P.	6.1	2.7	70	: :	: :	: :	: :	20	: :	4,790*	2,670*	: :	: :	25	300	20	: :	150,000
Modesto Irrig. Dist.	62.0	28.0	70	80	: 3	95	: 2	75*	: :	200	100	400	200	3,000	15,000	: :	: :	: :
Montana Power	30.0	1.5	70	85	10	92	: 2	50	: :	5,000	5,000	14,000	7,500	: :	: :	: :	: :	: :
Mountain States Power	25-60.*	12.0	55	85	10	98	: :	: :	: :	50	: :	250	200	500	: :	: :	: :	: :
New Mexico Power	: :	: :	: :	: :	: 13	128	: :	: :	: :	9,500*	4,500*	: :	: :	: :	: :	: :	: :	: :
Northwestern Elec.	47.0	24.0	77	: :	10	96	: :	: :	: :	88,000†	51,000†	499,000†	528,000†	194,000†	1,268,000†	44,000‡	71,003§†	285,285,000†
Pacific Gas & Electric	9.0	6.0	71	70	7	95	: :	30	: :	12,000†	9,800†	9,600†	6,000†	2,000†	3,600†	: :	: :	: :
Pacific Power & Light	24.3	17.6	50	85	10	90	15	50	: :	500	200	2,000	1,000	100	3,000	200	: :	682,000
Pasadena, City of	6.5	2.5	77	80	24	105	: :	70	: :	15,000†	15,000†	30,000†	20,000†	10,000†	50,000†	700	: :	20,000,000
Portland General Electric	40.0	16.0	65	: :	: :	: :	: :	: :	: :	700	500	1,500	1,000	1,000	500	: :	: :	500,000
Provo, City of	11.0	8.0	59	76	: 8	85	15	40	: :	1,100	500	21,000	13,000	2,000	5,000	: :	: :	6,000,000
Public Service of Colorado	6.5	: :	55	65	: :	: :	: :	: :	: :	10,000	8,000	25,000	: :	: :	: :	: :	: :	: :
Puget Sound P. & L.	42.0	20.0	64	: :	: 7	116	28	: :	: :	2,175	2,000	18,000	15,000	5,000	30,000	8,000	: :	: :
San Diego G. & E.	6.5	4.8	78	67	7	116	: :	: :	: :	10,000	10,000	: :	: :	: :	: :	: :	: :	: :
Seattle City Light	65.0	45.0	68	84	14	85	: :	: :	: :	730	400	1,210	1,270	450	2,000	: :	970§	: :
Sheridan Co. Electric	16.0	3.0	56	72	11	90	: :	: :	: :	15,000	10,000	75,000	75,000	15,000	100,000	25,000	: :	41,900,000
Sierra Pacific Power	62.0	20.0	80	: :	: 1	98	: 5	: 5	: :	200	200	1,000	750	100	: :	100	2,000‡	250,300*
Southern California Edison	9.5	2.0	70	45	5	95	5	50	: :	: :	: :	: :	: :	: :	500	: :	: :	: :
Southern Colorado Power	19.0	7.0	65	65	: :	: :	: :	: :	: :	250	250	500	500	200	1,000	: :	: :	200,000
Tacoma, City of	54.0	39.0	: :	: :	: :	: :	: :	: :	: :	300	250	1,000	500	200	1,000	: :	: :	: :
Telluride Power	17.0	: :	50	90	: :	: 99	: 9	: 38	: :	: :	: :	: :	: :	: :	: :	: :	: :	: :
Tucson G. E. L. & P.	8.0	2.0	68	45	2	99	9	38	: :	300	250	1,000	500	200	1,000	: :	: :	114,000
Uintah P. & L.	12.0	3.0	88	88	2	88	2	18	: :	200	200	200	100	15	300	: :	: :	10,000,000
Utah Power & Light	40.0	5.5	75	: :	3	100	7	71	: :	: :	: :	: :	: :	: :	: :	: :	: :	: :
Washington Water Power	37.2	32.0	73	65	10	95	20	70	: :	15,000	12,000	20,000	25,000	7,500	36,000	3,500	: :	15,000,000

‡ Irons. § Desert coolers. ‖ Home freezers. * See accompanying reports for explanation and interpretation. † Five years following war.

considering the new developments in residential appliances that may receive general acceptance, as well as the effect of promotional efforts on the present lines of appliances, we feel that a not too optimistic figure for 1950 is 1,500 kwh. and for 1955, 2,000 kwh.

In estimates of major appliance per cent of saturation, we prefer to publicize very conservative estimates, which are the same being given to manufacturers, distributors, and others, and thus not mislead them in their market analyses. Thus, we expect our electric range saturation to increase from 6.1% as at present, to 13% by 1955; and for water heaters, from 2.7% to 8.4%. This compares to the increase from 1.3% to 6.1% in range saturation, and the increase in water heater saturation from .37% to 2.7% during the ten years prior to 1942.

While conservative in view of our own, as well as the presently indicated sales promotion plans of the appliance manufacturers, these figures represent a considerable yearly sales volume when the increase in residential consumers, the replacement business, and the ratio of new sales to net gains are taken into consideration. The following tabulation indicates the annual range and water heater sales necessary to reach these saturations:

Year	Estimated Total Range Sales	Estimated Total Water Heater Sales
1944	1,535	640
1945	4,790	2,670
1946	7,850	4,840
1947	8,800	4,860
1948	9,750	5,470
1949	10,800	6,090
1950	11,950	6,800
1951	12,650	6,950
1952	12,700	7,000
1953	13,500	7,450
1954	14,000	7,950

The department is now conducting a spot survey of its consumers to determine, from an advertising and sales promotion point of view, factors which will influence the sale of the major kitchen and laundry appliances. The survey is not complete, and information obtained to date must be qualified because the survey so far has been of single-family accommodations and does not include the low-income population, which represents about 10% of the total. An incomplete summary of some of the replies is as follows:

Approximately 22% indicate they may build new homes postwar. From restricted lists of kitchen and laundry appliances, which do not include small appliances, the indicated order of purchase of electrical appliances when they become available is: washer, range, refrigerator, ironer (iron not included), water heater, home freezer, dishwasher, and garbage disposer. Electric refrigerators are preferred by

the majority, and the preference for electric ranges has increased measurably. No estimate has been made of the probable market for small appliances. This survey to date represents only a very small percentage of the residential consumers, and may not yet represent a true cross-section of consumer opinion.

All studies have not as yet been completed, and the estimates are subject to revision. You may expect changes in the future.—*Chas. C. Snyder, business agent, power system.*

Modesto Irrigation District

A DEALER cooperation and a lighting specialist will be added to the staff of Modesto Irrigation District postwar to lay out wiring and lighting jobs and to assist in dealer sales programs. The district does not plan to merchandise. Educational classes of contractors, dealers and the public will be conducted to educate the public on adequate wiring and future appliance use. Meanwhile advertising will continue on care and use until appliances are available.

There has been an increase of population in the territory served and with it of customers. Approximately the same level is expected after the war. Domestic kilowatt-hours will continue to increase, it is felt. The proportion of war load at the present is negligible.

Pacific Gas and Electric

MERCHANDISING only of selected appliances in selected areas is planned by Pacific Gas and Electric Co., according to O. R. Doerr, general sales manager. The company will have a large staff of dealer promotional representatives and home service women who will work in close cooperation with dealers. Special emphasis will be placed on home freezers, automatic clothes washers, clothes dryers, dishwashers, kitchen planning and adequate wiring.

War-built homes, new homes and prewar-built homes inadequately wired create a special need for promotion of wiring and a very aggressive program consisting of advertising and field coverage of war-built homes, prewar-built homes and new homes will be conducted.

The company, long a pioneer in lighting promotion, will continue to promote better lighting. An advisory service to all commercial and industrial customers will be furnished to provide for adequate and complete usage of equipment. Technical assistance will be furnished to war industries to improve efficiencies and also

Merchandising—Dealers—Policy—Staff—Sales Emphasis

Utility—Territory	Plan to Merchandise Direct?	No. Dealers Pre-war	% Dealers Remaining	Postwar Dealer Policy in Brief	Sales Dept. Staff Pre-war	Sales Dept. Staff Now	Sales Dept. Staff Post-war	Home Service Staff Pre-war	Home Service Staff Now	Home Service Staff Post-war	New Sales Emphasis Postwar to Be on—
Alameda, City of	No	6	60%	Free range wiring—advertising.	0	0	0	0	0	0	Electric ranges and water heaters.
B. C. Elec. Ry., Vancouver	Limited	151	80%	Plans incomplete; cooperative.	55	21	60	6	4	7	Water heaters, home freezers, ranges.
B. C. Elec. Ry., Victoria	Limited	16	100%	Campaigns, displays, sales training	16	7	7	2	1	2	Same as above.
Calif. Elec. Power	Yes	No data	80%	Competitive but cooperative.	15	5	20	5	3	3*	Home freezers, radio, clothes dryers, special service.*
Calif.-Oregon Power	Limited	29	90%	Advertising and promotion.	70	6	20	2	0	2	Not determined.
Central Ariz. L. & P.	No	107	90%	Cooperative program, assist dealers	8	0	12*	7	7	7	
Coast Counties G. & E.	Yes	30	60%	Cooperative—same as prewar.	8	1	10	1	1	1	None.
Colorado Springs, City of	No	10	100%	Advertising and display space.	0	0	0	0	0	0	Home freezers, ranges, water heater, lighting, commercial cook.
Eastern Ore. L. & P.	No	22	50%	Promotional help, adv. training.	5	2	5	0	0	2	Undecided as yet.
Eugene Water Bd.	No	20	60%	Undecided as yet.	0	0	0	0	0	0	Nothing determined at this time.
Glendale, City of	Undecided	10	30%	Undecided.	4	0	?	1	1	1	Air conditioning, home freezer, commercial cooking, refrigeration.
Hawaiian Electric	Yes			Plans incomplete.	50	14	75	6	3	10	Home freezers, germicidal lamps, automatic laundry, dish washers.
Idaho Power	Yes		90%	Assist dealers*	90	30	45	8	4	8	Home freezers.
Imperial Irrig. Dist.	No	410	100%	Cooperative advertising and promotion	2	1	3	10	6	12	Kitchen, laundry equipment, ranges and water heaters.*
Los Angeles Dept. W. & P.	No	180	50%	Advisory service.*	35	32	57	14	8	12	Will do advertising in newspapers.
Modesto Irrig. Dist.	No	12	60%	Two men in promotion dept.	2	0	2	6	6	6	All services.
Montana Power	No	350	60%	Assist dealer—distrib. organization	87	19	?	17	7	7	Lighting, heating, adequate wiring, farm service.
Mountain States Power	No			Not ready—cooperative.	6	0	12	2	0	3	Home freezers.
New Mexico Power	No	5	100%	Cooperative advertising etc.	6	0	0	0	0	0	Home freezers.
Northwestern Elec.	No	240	80%	Full cooperative program.	50	8	54	10	1	6	Home freezers, automatic washers, clothes dryers, kitchens.*
Pacific Gas & Elec.	Yes, selected*	1,742	87%	Dealer promotional representatives.	531	268	560	15	11	28	Plans incomplete.
Pacific Power & Light	Limited*	254	55%	Plans incomplete.	40	0	?	13	0	?	Ranges, water heaters, refrigerators, air conditioning.
Pasadena, City of	No	40	40%	Advertising and service cooperation.	2	0	2	?	0	?	Home freezers, laundry kitchen, commercial, space heat.
Portland Gen. Elec.	No	200	78%	Full time dealer promotion dept.	33	20	35	9	1	1	
Provo, City of	No	10	100%	Cooperative.	2	1	2	1	1	1	All load building equipment.
Public Serv. of Colo.	Yes	125	25%	Dealer promotion dept.*	263	172	275	6	1	8	Not decided.
Puget Sound P. & L.	Undecided	107*	90%	Dealer promotion, advertising.	7	0	?	11	9	20	Home freezers, automatic washers, dishwashers, etc.
San Diego G. & E.	No	175	90%	Coop. comp. advt., demonstration.	48	12	25	2	2	?	Automatic washer and clothes dryer.
Seattle City Light	Ranges, w.-h.*	90	75%	Sales training, promotion.	14	0	10	3	3	3	Water heating.
Sheridan Co. Elec.	No	8	60%	Advertising and dealer help.	0	0	0	0	0	1	Depends on new appliances and conditions.
Sierra Pacific Power	No	65	40%	The Reno plan continued.	0	0	0	1	1	1	Air cooling, home freezer and clothes dryer.
So. Calif. Edison	Yes		46%	Cooperative plan.	165	20	200	35	35	40	Plans indefinite.
So. Colorado Power	Undecided	25	75%	Not decided.	14	5	14	1	0	2	Ranges, water heaters, dryers, home freezers
Tacoma, City of	Undecided			Undecided as yet.	...	...	...	...	...	...	Home freezers, farm freezers.
Telluride Power	Yes	14	70%	No plans.	4	1	5	1	0	1	
Tucson G. E. L. & P.		30	60%	100% dealer cooperation.							Work with dealers.
Uintah P. & L.	No	3	100%	Dealer cooperation.	1	0	0	0	0	0	Air conditioning, freezers, dryers, electric blankets.
Utah Power & Light	No	629	100%	Complete cooperation.*	90	51	83	12	5	13	As new appliances are developed.
Washington Water Power	Yes	290	85%	Coop. advt. and sales programs.*	80	28	85	25	2	30	

* See accompanying reports for explanation or interpretation.

to assist industrial customers faced with reconversion when contracts are terminated. An expanded program contemplating increased applications of elertricity on the farm is being prepared, with a territorial plan to provide complete customer coverage each year, plus increased cooperation with farm equipment dealers.

Advertising plans for 1945 are for emphasis on adequate wiring, kitchen planning, appliance desire building until appliances are available, and when available, sales copy on them.

Kilowatt-hour increases, it is felt, are due principally to doubling up of families and wartime conditions of longer use. However it is felt that the trend will be continuously upward, except for a possible recession during one year. An increase of approximately 25% is anticipated by 1950.

The figures in ELECTRICAL WEST's table on accumulated demand differ from previous figures given to *Electrical Merchandising* because the period covered in the estimate is taken from the latest postwar study made by the company, *Potential Domestic Appliance Market Through 1950*, No. 5 of the series. The previous figures were for estimates through 1947.

Postwar market studies are being made by this company on a scale and with a thoroughness that is exceptional and the studies are being given to dealers, contractors, wholesalers, banks and others as an aid to them to appraise their own potential markets each year and in each marketing area for the next five years. Few dealers or wholesalers would have the staff, the facilities or the contacts to gather together the information which is put into these books. Another unique feature is that the dealer gets only the data pertinent to his own trading area. In other words it is tailor made to his own market.

So far the issues of these studies have included the first one on population, the second on housing, third on purchasing power, and fourth on appliance saturation. The fifth, with potential markets by appliances is being printed and will be distributed soon. Another on the availability of appliances may have to await further developments.

Master books, containing the data for all divisions and marketing areas, are furnished manufacturers, distributors, banks and division and head office executives. The large territory served by the company is divided into 13 divisions and these broken up into 65 trading areas. Each trading area may have one or more trading centers where normal trading is done by people living in that area. Maps of these trading areas are provided in the first book, on population and customer trends.

Thus each division has a map of trading areas in it and a breakdown of actual customers and population in 1940, and then yearly estimates of each for each year from 1943 to 1950 and for every trading area and the total division. Summarizing these estimates PG and E expects to see population increase from 2,956,403 in 1940 to 3,783,183 in 1950; and to serve 935,743 electric customers in 1950 as against 812,252 in 1943. Population increase is estimated to be 116.7% of 1940 in 1943 and to grow progressively .2, .5, 1.6, 2.7, 5.1, 7.4 and 9.7 of 1943 for succeeding years. Electric customers are estimated to increase 2, 3, 6, 8, 10, 13 and 15% of 1943.

The housing study appraises on the same trading area basis, the permanent war housing, temporary housing; estimates the probable abandonment or eradication after the war, the postwar housing to be built and the new housing units required, by years for five years. The totals show 48,334 permanent housing units built, 58,100 temporary units, and new homes required totaling 157,622 for the five-year period. An interesting table is also inserted, forecasting the percentage of houses which may be built in the less than $5,000, $5-7,500, $7,500-10,000, and over $10,000 class in each division. The largest percentage of homes will be in the $5,000-$7,500 class in densely populated areas and more in the less than $5,000 in less dense areas.

The purchasing power survey could not be broken down by trading areas but most of it is reduced to counties and thus into divisions. It contains figures as to 1941 and 1943 bank deposits, savings and commercial segregated, war bond purchases from 1941 to 1944, income of individuals for 1939 and 1942, retail sales and effective buying income index from *Sales Management*, plus much other national data covering financial trends and buying power indices. This book alone is one which no dealer would have facilities or time to compile for himself and yet is exceedingly valuable as a guide.

Saturation is broken down by trading areas. This book contains two pertinent pieces of information for the dealer. First is the present saturation for each of 12 electric and seven gas appliances by number and by percentage. Then follows a record of the sales of each of those appliances in that trading area for the five years from 1939 to 1943. More remarkable is the fact that these figures are furnished

The West's Wired Homes and Appliance Saturations by States as Appraised by Electrical Merchandising

	Customers				Washer Saturation				Refrigerator Saturation		Range Saturation		Radios Saturation	
State	Total domestic and farm Customers Jan. 1, 1945	Total urban Customers	Total rural non-farm Customers	Farm Customers	Washer users, gas and electric	% of wired homes	Ironers users	% of state wired homes	Refrigerators % of total home users	state wired homes	Ranges % of total home users	state wired homes	Radio sets, % of total homes having	state wired homes
Montana	98,248	52,163	35,153	10,932	84,180	85.68	8,496	8.65	65,313	66.48	24,451	24.89	146,400	87.09
Idaho	117,412	48,520	35,236	33,656	71,370	60.79	6,952	5.92	75,210	64.06	42,115	35.87	131,150	87.53
Wyoming	43,914	22,916	15,624	5,374	31,110	70.84	4,055	9.23	25,730	58.59	4,620	10.52	64,050	87.63
Colorado	235,787	150,525	60,738	24,524	173,850	73.73	16,799	7.12	140,523	59.60	22,265	9.44	280,600	84.38
New Mexico	62,409	35,262	20,155	6,992	29,280	46.92	1,931	3.09	35,626	57.08	3,482	5.58	73,200	54.14
Arizona	100,078	48,323	43,563	8,192	67,710	67.66	6,180	6.18	63,334	63.28	7,338	7.33	94,550	68.09
Utah	143,848	86,302	37,588	19,958	133,590	92.87	11,200	7.79	98,960	68.79	41,368	28.76	137,250	93.89
Nevada	26,872	12,396	12,701	1,775	14,640	54.48	2,124	7.90	21,771	81.02	9,240	34.39	27,450	83.46
Mountain	828,568	456,407	260,758	111,403	605,730	73.11	57,737	6.97	526,467	63.54	154,879	18.69	954,650	81.13
Washington	533,596	318,900	147,124	67,572	353,190	66.19	50,592	9.48	310,734	58.23	174,865	32.77	512,400	91.05
Oregon	296,334	167,394	80,413	48,527	193,979	65.46	26,841	9.06	184,066	62.11	111,135	37.50	317,200	89.48
California	2,202,739	1,662,641	419,825	120,273	1,374,331	62.40	237,513	10.78	1,367,627	62.09	131,160	5.95	2,101,450	93.81
Pacific Coast	3,032,669	2,148,935	647,362	236,372	1,921,500	63.36	314,946	10.39	1,862,427	61.41	417,160	13.76	2,931,050	92.83
U. S. Total	28,436,657	19,805,073	6,022,624	2,608,960	18,300,000	64.35	1,931,000	6.79	19,792,000	69.60	3,554,000	12.50	30,500,000	83.46

also for some areas where the company does not serve either the gas or perhaps the electric service but another utility does. The saturation percentages in the tables on these pages are derived from these studies.

The study on appliance potentials is not yet available for detailed review but the figures in the accompanying table are taken from it. Like the others it sets forth the potential business by trading areas so that the dealer may compute his own market.

Similarly thorough studies are being made of the agricultural, the lighting, the commercial and industrial future in the area served by this utility.

City of Pasadena

SINCE individual dealers have their own organizations the municipal Light and Power Department of Pasadena relies upon them to do the merchandising, with assistance and educational advertising and service from the utility. Electric ranges, water heaters, refrigerators and air conditioning will be featured. The department feels that adequate wiring promotion is necessary in order that customers may use all the postwar appliances. Capacity will have to be installed, either at the time the house is built, or at the time the appliance is installed, and the latter is always expensive. Educational advertising on wiring, as well as contractor and builder contacts will be engaged in to further this program. Wiring will also be furnished for electric ranges.

Population has increased about 10% and is expected to continue to do so after the war with corresponding domestic customer growth. A growth in domestic kwh. consumption is also expected at the rate of 5% each year for at least 10 years. The present war loads are about 10% over normal.

San Diego G. & E.

BIG problem facing San Diego Gas & Electric Co. after the war will be to retain as much of its present industrial business as possible and to replace whatever is lost by more industrial, commercial, lighting, agricultural and domestic usage. All sales, domestic as well as commercial and agricultural, will be through dealers but the utility will carry on cooperative campaigns, advertising, demonstrations, etc.

In lighting no direct sales will be made, but there will be lighting advisors on domestic, backed by advertising and sales promotion. Advertising, sales promotion and solicitation on commercial and industrial will be done, giving layouts and making recommendations. For the commercial and industrial power program the utility expects to cooperate with dealers in rebuilding power load, especially in air conditioning and commercial refrigeration. The company hopes to see dealers develop organizations and facilities to do the full selling job.

Studies of postwar market factors made by Pacific Gas and Electric and furnished to dealers and distributors to aid them plan their own distribution

In agricultural power a man will devote his full time to sales through qualified dealers and in cooperation with manufacturers and farm groups will promote utilization equipment. In all phases the utility wants to act upon a wholesale or mass basis and leave it to the trade to do the individual sales job, according to A. E. Holloway, vice-president in charge of the commercial department.

Domestic load building plans of the San Diego Gas & Electric Co., as drafted by E. W. Meise, superintendent of domestic electric sales, call for placing of four representatives in the field to aid electrical dealers in becoming strong merchandising outlets.

Electric appliance dealers in the Chula Vista, Escondido, La Mesa, Oceanside, and Capistrano districts will be given all cooperation possible in the sales of electric ranges and water heaters. A field representative in charge of this activity, working through the company's district managers, will make every effort to aid dealers in sales campaigns, cooking schools, sales methods, and displays. In addition, he will furnish dealers with "live" prospects on an equitable basis, and notify dealers in advance of contemplated extensions of the utility's electric service.

In order to encourage bona fide electrical dealers, this aid will be rendered to electrical retail outlets who operate an electric appliance store in the district, maintain adequate appliance displays, render delivery, installation, repair services, report monthly records of sales to the company, and follow up all prospects furnished with a home call. Working in a similar capacity with electrical dealers all over San Diego County will be a company representative to promote table appliances, dishwashers, disposals, washers, dryers, ironers, irons, vacuum cleaners, radios and refrigerators, and home freezers.

In the belief that home lighting sales offer great over-all expansion possibilities in the postwar period, Meise plans for a representative who will specialize in home lighting. He will assist dealers in proper lighting displays and sales methods and help conduct "empty socket" campaigns. In addition, he will give assistance in lighting layouts for new homes and promote campaigns directed toward better fixtures and portable lamps.

Still a fourth field representative will help relieve the bottleneck to many appliance sales that exists due to inadequate wiring in homes. A recently completed survey showed that the average San Diego home had but two electrical circuits. That many of these circuits are overloaded is demonstrated by the fact that before the war many ironers and roasters were returned to dealers because purchasers could not use them on their present wiring.

The wiring representative will sell architects, builders, electrical contractors and engineers on the advantages of better wiring. He will keep financial institutions advised as to what constitutes proper wiring for modern construction and what poor wiring does toward making home investments in-

Estimates of Probable Appliance Sales in San Diego County

The following estimates have been made by the Bureau of Radio and Electrical Appliances of San Diego County, as of Sept. 1, 1944, for the FIRST FULL YEAR after manufacture of each of the appliances listed has been resumed. Obviously, this period will differ in several instances. Sales figures as given for 1940 and 1941 are from our records which have been kept for many years:

Appliance	1940 Sales	1941 Sales	194-X Sales
Radios	16,600	21,175	30,000
Refrigerators	10,700	12,000	18,000
Electric ranges	600	725	2,175
Electric water heaters	525	560	2,000
Washing machines	5,875	6,925	15,000
Automatic ironers	985	1,195	5,000
Vacuum cleaners	3,485	4,600	9,000
Food mixers	2,565	3,210	8,000
Roasters, cookers	1,125	1,315	4,000
Coffee makers	6,725	7,970	15,000
Toasters	7,025	9,225	20,000
Electric irons	7,325	7,500	20,000
Waffle irons	2,710	3,470	8,000
Hot plates	1,315	1,710	2,500
Electric heaters	2,300	2,330	8,000
Heating pads	1,935	1,950	4,000
Sewing machines	1,710	2,440	5,000
Electric clocks	8,350	10,100	15,000
Home & farm freezers	...	...	3,000
Gas ranges	8,268	9,100	15,000

How You Can Help Postwar Employment

Many manufacturers are making plans now to enable them to maintain full employment in their factories after the war. In order to plan properly, these manufacturers must have some advance information as to what products consumers like you will want to have when they are available.

You can be of help to such postwar planning by checking the spaces on the reverse side of this survey card and mailing it at once. If you will sign your name and address, we will send you literature on the subjects checked as soon as such literature is available.

SOUTHERN CALIFORNIA EDISON COMPANY LTD.

Gentlemen:

I am interested in having the following electrical appliances when they again are available:

☐ Refrigerator - New ☐ Replace one now in use ☐ Home freezer units (food storage)
☐ Range ☐ Ironer ☐ Others
☐ Water Heater ☐ Dishwasher
☐ Washer ☐ Garbage disposal unit

What improvements would you like to see in appliances?

Do you intend to remain in Southern California after the war? Yes ☐ No ☐
Do you plan building a new home after the war? Yes ☐ No ☐
Do you plan additions or alterations to your present home after the war? Yes ☐ No ☐

Name
Address

No 184

Postcards like those shown above were mailed to all domestic customers on the lines of Southern California Edison Co. Information derived from this survey is now being incorporated in the market study book due soon

secure. This representative will also assist architects and prospective home owners with proper specifications and wiring layouts. Stress will be placed on having sufficient outlets properly located in each room and the advantages of installing circuit breakers instead of fuses.

Augmenting the work of the four field representatives will be a home economics department, which will develop leads on major appliances for the dealers and emphasize the importance of quality appliances. All domestic appliance sales activities will be backed up by advertising campaigns, many of which will be conducted by the Bureau of Radio and Electrical Appliances. Although everything possible will be done to develop the market, the company will do no direct selling or solicitation for the dealers.

Sales schools designed particularly for the dealers' needs will be conducted from time to time. These will be general in nature, i.e. subjects taught will be salesmanship, domestic electric rates and how best to use them in appliance selling, the advantages of electric cooking, and other sales helps.

The utility completed a survey in April, of last year, of domestic customers in the city of San Diego to determine the appliance saturation, the per cent of appliances out-of-order, and the per cent of appliances not in use for other reasons. A copy of the results of this survey follows, the last column is the sum of the two preceding. This is not representative of the entire territory, since the sale of electric ranges and water heaters was promoted strongly in the area outside San Diego itself.

Appliance	Per Cent Saturation	Per Cent Out of Order	Per Cent Don't Use	Per Cent Out of Service
Refrigerator	76.2	1.2	0.0	1.2
Radio	116.0	4.0	0.2	4.2
No Radio	1.3			
Washer	67.0	2.2	0.3	2.5
Ironer	7.4	5.7	5.7	11.3
Vacuum Cleaner	75.4	4.3	0.7	5.0
Clocks	79.7	3.1	0.6	3.7
No Clocks	31.1			
Coffee Makers	31.0	8.2	18.6	26.8
Grills	15.6	4.0	30.7	34.7
Heaters, Elec.	28.6	2.5	10.1	12.6
Heating Pads	36.0	5.5	8.9	14.4
Irons	102.4	2.6	0.7	3.3
No Irons	1.2			
Mixers	30.2	3.4	7.2	10.6
Roasters	7.1	7.6	9.4	17.0
Sewing machines	29.2	0.0	1.5	1.5
Shavers	19.1	6.2	8.6	14.8
Toasters	76.8	5.2	5.0	10.2
Waffle irons	56.3	2.9	13.8	16.7
Electric ranges	1.2	0.0	0.0	0.0
Elec. water heaters	0.6	0.0	0.0	0.0

It was found that the average number of appliances per home in the city of San Diego was 8.6.

Customers were also asked about their postwar purchase preferences. Of those surveyed, 64.2 per cent had a definite postwar purchase preference.

The purchase preference of this 64.2 per cent was as follows:

Preference for electric kitchen	1.5%
" " " refrigerator	20.7%
" " " washer	10.9%
" " " ironer	2.1%
" " radio or small appliances	11.1%
Total preference for some electrical appliance	46.3%
Preference for new home	24.9%
" " remodel present home	9.0%
" " new car	13.3%
" " trip	6.5%
Total preference for other than electrical appliances	53.7%
	100.0%

"Our promotional and advertising plans for 1945 will follow the general plans of 1944," said Meise, "when care and use was number 1 and dealer helps was number 2. We did not go overboard with joy at the prospect of electric irons but tried to tell the customers that there were only a few irons to be had, stressing the fact that those who need them the most should get them first, with an implication that the method of releasing irons was a forerunner of things to come as other appliances may be released. Any future advertising along this line will be based on the progress of the war and release of more appliances.

"The electrical industry of San Diego has agreed that this period is a good time to begin promoting better wiring. Although nothing can be done about wiring at the present, wiring promotion is a long range activity. Some of our 1945 promotion will be on trying to sell customers on planning for better wiring today to be able to use the appliances of tomorrow."

Southern California Edison

THE average kilowatt-hour consumption has shown a steady increase during the past three years due largely to industry working on a three-shift basis and a great many families are having to double up. We have 105 families for each 100 houses in Los Angeles county, all of which tends to overwork electrical systems.

Market studies which we are making will be completed about the middle of February. We are attempting to combine in one book a breakdown of the trading areas, number of meters (indicating families) in each trading area, new home construction by years since 1940, estimate of construction in 19V1 and an estimate of the potential market for electrical appliances in 19V1.

Supplemented with per capita income figures, appliance saturation figures and other data, this will enable manufacturers, wholesalers and dealers to appraise the market for its future possibilities. Also included will be maps showing the outline of our districts, indicating the offices, transmission lines, substations and generating plants.

All of the residential construction, we find, for the last two years has been defense housing and there is not likely to be any other kind until after V-Day.

We plan to merchandise as before the war but will continue our cooperation plan for dealers. Sales emphasis will also be put on air cooling, the home freezer and the clothes dryer. We plan to continue participation in home planning institutes as a means of promoting adequate wiring and home appliance use. Contacts will also be made with builders, architects and contractors and direct-mail advertising done.

Following is a compilation of dealers of various classes on Southern California Edison lines:

Electrical dealers	150
Electrical contractor-dealer	98
Wiring contractor	121
Hardware	108
Furniture	98
General merchandise	46
Tire and auto	52
Radio dealers	51
Miscellaneous	50
Total	774

In lighting the company will participate in the Better-Light program, have a sales force, do advertising, conduct displays. In agricultural power the company plans to be very aggressive, with salesmen and promotion through advertising and direct mail.

Population in the territory of the company has increased 400,000 or more compared to prewar and may level off. The number of domestic customers increased for five years and will now level off, due to the housing shortage.—*H. C. Rice, manager of domestic sales.*

Colorado

Colorado Springs

IMPROVEMENTS in street lighting, aid to the chamber of commerce in development of industrial and commercial expansion, revision of the city wiring code to affect adequate wiring are among the things which the Department of Public Utilities of the city of Colorado Springs plans. It will not merchandise but will assist dealers with advertising and by furnishing display space in its office.

Present population compared to prewar is up 15% but it is expected that it may drop 10% after the war. However domestic consumption is expected to continue upward. Present war load is about 32% of the total.

Public Service of Colorado

A DEPARTMENT has been established by the commercial department of Public Service Co. of Colorado to contact dealers with the view of promoting cooperative endeavor. Although the company will merchandise, an attempt will be made to coordinate sales campaigns and advertising of all dealers, keep them informed of our plans, permit their use of our testing laboratory facilities and render engineering assistance when requested.

Because most of the older homes have inadequate wiring, we have been stressing the need for adequate wiring for several years in our advertising and have had qualified speakers talk on this subject when possible. We will cooperate with the Rocky Mountain Electrical League in promoting the idea among other dealers, electricians, builders and architects. Distribution of literature will be made and work done with the Denver Chamber of Commerce and RMEL in connection with home planning for the future.

In lighting the company will engage in the promotion and sale of certified lamps in homes, proper illumination for seeing tasks in commercial and industrial institutions, proper display and decorative lighting of commercial institutions, promotion of street and highway lighting and furnishing of engineering service when requested.

For industrial and commercial load building it is intended to render engineering service and sell consuming equipment when desired by our customers. To build agricultural load we will have rural representatives to assist farmers with their power problems, particularly in connection with irrigation pumping and other power needs and sell the equipment when desired.

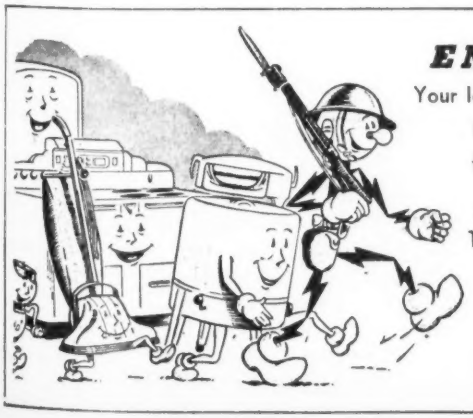
Meanwhile the advertising and promotional efforts of the company will remain about the same as during the past year during 1945. When appliances become available, much promotional advertising will be employed. Advertising now is about 60% on war effort themes, 10% each on institutional and dealer help and 20% care and use.

The official population of Denver in 1940 was 322,412 and estimates which appear reasonable indicate that it now is 355,000, or an increase of about 33,000. It is also estimated that Denver and environs increased from 406,000 in 1940 to 450,000 now, which is an increase of 44,000. Because of a very acute housing shortage, many who work in Denver are forced to live in towns beyond the boundaries of the environs. This has created the effect of having a much lower increase in population than should have resulted from the increased number of employed persons in this area.

In 1940 there were 142,000 employed persons as compared to 186,000 now. This is an increase of 44,000 workers, which is equal to the total growth in population. It is estimated that the peak of employment occurred in November 1943, when there were 206,000 workers. This was just at the time when the Remington Arms plant started its curtailment program, which ultimately led to its discontinuance of the manufacture of small arms ammunition and the elimination of approximately 18,000 workers. A part of the plant has now been remodeled and re-equipped to produce large caliber ammunition under the direction of Henry J. Kaiser.

There are now approximately 100,000 dwelling units in Denver, with practically no vacancies. Normally, vacancies average from 4% to 7%. In 1940 and 1941, the last two years in which building materials were not under governmental restrictions, 5,872 new dwelling units were constructed. Since there has been relatively little home building during the last two and one-half years, it seems reasonable to assume that at least 10,000 new dwell-

Registration card sent to all domestic customers of Public Service Co. of Colorado which were returned with lists of appliances for trade in the company's trading post. This helped distribute a surplus to benefit many



ENLIST

Your Idle Appliances in the Fight for Victory!

Sell Them! Trade Them!

BUY WAR STAMPS

APPLIANCE REGISTRATION CARD

I wish to register with the Trading Post:

Appliance _____

Make _____

Size _____ How old is appliance? _____

Is it in operating condition? _____

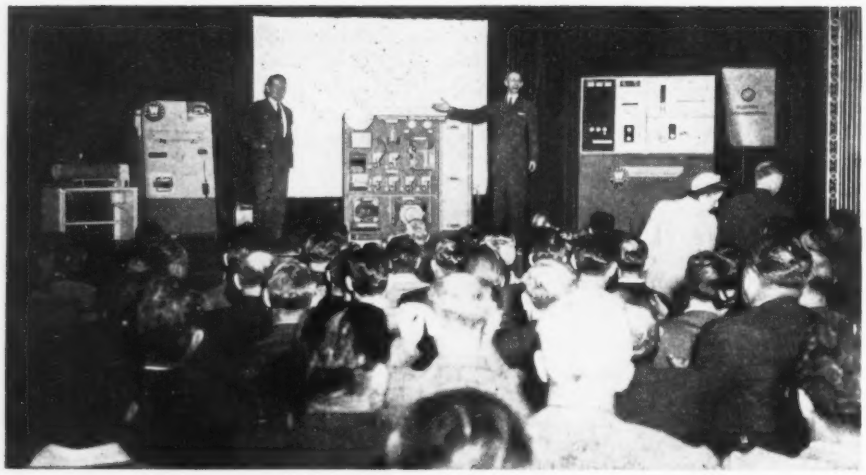
If not, what repairs are needed? _____

Name of Owner _____

Address _____ Tel. No. _____

Remarks: _____

This service is rendered in cooperation with the War Production Board. The Public Service Company of Colorado assumes no responsibility in this transaction.



Conservice schools such as this were conducted by Westinghouse throughout the entire West early in the past year and attended by service repair personnel

ing units will be erected during the first two years after building materials become adequately available.

The chamber of commerce, city officials and various business concerns are cooperating in making an industrial survey with the hope of inducing a number of manufacturers to establish plants here. This effort has already been fruitful in a small way and there still are many possibilities. It does not seem unreasonable to assume that there should be sufficient industrial development in this area to retain permanently 25,000 more workers than there were in 1940. On the basis of the 1940 ratio of employed persons to total population, the 25,000 additional employees should represent an increased population of 56,750. This, when added to the 406,000 residents of 1940 would make 462,750 if all resided in Denver and environs.

It has been estimated that the income of this area, including that of war plant workers and all overtime, has increased approximately 60% over prewar levels. The elimination of overtime alone would reduce this figure by approximately 20% and the elimination of 19,000 workers would add 10% more to the decline. If it is possible to maintain full employment for those remaining thereafter, the income of the area under this line of reasoning should be 30% above prewar levels.—*G. B. Buck, vice-president.*

Southern Colorado Power

PLANS as to whether to merchandise or not are not yet decided by the Southern Colorado Power Co. but increased promotions are promised for postwar lighting, industrial and commercial and agricultural load building. For wiring it is planned to tie in with national and regional plans, such as through the Rocky Mountain Electrical League.

While the population in Pueblo has remained about the same, that for the metropolitan area has increased about 15% and no over-all change is expected from now on. About 5% of the kwh. sales are war load. Domestic consumption is expected to increase after the war ends. Figures in the table for appliance total, dollar value, are estimated exclusive of radio.

Idaho

Idaho Power

A PROGRAM that will increase the farmers' income through the use of electricity, securing 90% saturation of farms with electric service by 1950 and increasing the use of household appliances, is the aim of Idaho Power Co., according to Ralph Gale, general commercial manager. "We want dealers to sell all equipment," he said, "but where their sales are not meeting quotas we will also sell to make up the difference."

An aggressive sales promotion plan on the part of dealers and the company will be engaged in to stimulate lighting. For industrial and commercial customers a program to develop present and to bring in new customers will be carried on, with continued aggressive sales promotion to commercial customers.

At the present time the company is using manufacturers' programs promoting adequate wiring, holding meetings with the industry and after the war will continue with advertising and promotion. Home freezers, germicidal lamps, automatic home laundry equipment and dishwashers will receive special emphasis postwar.

Advertising and promotion in 1945 will stress care and use and if any type of equipment becomes available advertising will be done on it from a dealer help angle.

Population has decreased about 5% in this company's territory so is expected to increase about 5% a year after the war with domestic customers and consumption likewise. There has been almost no war load in this territory.

Montana

Montana Power Co.

INSTEAD of merchandising, as it did in the past, Montana Power Co. will build a utility-manufacturer-distributor-dealer sales plan to clear all merchandise through dealers. Emphasis will be given to all services, according to D. J. McGonigle, general sales manager. There will be active lighting promotion, embracing all new developments in all phases of illumination.

Montana is primarily a raw material producer, hence has limited industrial possibilities but it is planned that there will be active commercial load building on all commercial applications and in agricultural power complete load building activity.

Public enlightenment on adequate wiring is planned, with special emphasis on new construction, for present wiring is entirely inadequate to serve the anticipated postwar loads.

Advertising in 1945 will continue the so-called institutional copy with emphasis on the advantages of the free enterprise system and the cheapness and efficiency of electric service furnished by investor-owned and business-managed utilities.

Montana population has suffered from the war. It is estimated that from April 1, 1940 to April 1, 1943 it had lost 88,237 or 15.8%. Therefore after the war it is expected to increase and with it the number of domestic customers. It is also anticipated that an average increase of 700 kwh. per customer will be made by the end of the first five-year period postwar.

Nevada

Sierra Pacific Power

OUR policy during 1945 will remain the same as during the war years. All advertising will be directed toward winning the war and featuring copy on war loan drives, Red Cross, salvage, and every worthwhile effort.

Most of our time is being spent trying to discourage a large number of people from entering the electrical appliance business after the war. From

all appearances we will have a tremendous dealer organization when things return to normal and we'd much prefer to see the legitimate dealers keep the business. We will continue the Reno Plan which has been so successful in the past.

Lighting promotion will be carried on in cooperation with dealers, architects, contractors and others. No industrial, commercial or agricultural programs have been decided as yet. Advertising and dealer promotion will be applied to solve the wiring situation. A large majority of houses are not adequately wired for postwar appliances.

Population has been slightly better than a normal growth and with it a corresponding number of domestic customers. Only 5.71% of present kwh. sales are war load. Steady increase in kwh. domestic consumption is foreseen. Yearly revenue per residential customer is now $63.72 and average consumption is 2,066 kwh.—*A. L. Pierce, new business department.*

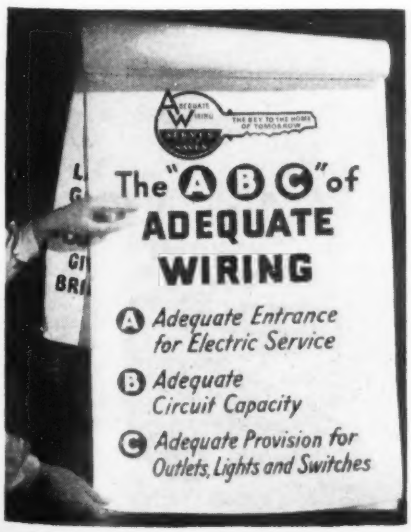
New Mexico

New Mexico Power

AT the present time the plans of New Mexico Power Co., of Santa Fe, do not call for merchandising. The company has been out of merchandising since 1938. Cooperative advertising and promotion for dealers will be carried on. The Better-Light program will be publicized for lighting promotion both for homes and for commercial premises. The company serves no agricultural power.

Wiring promotion will be carried on by advertising, by demonstrations and with the help of local electricians and the city inspector. Home freezers will receive major emphasis in postwar promotion. No figures are available as to saturation. There are very few water heaters and only a few ranges.

Population has increased and possibly may drop after the war, which may affect the number of domestic customers but little change is anticipated in domestic consumption. Only about 2% of present sales are war load.


The "A B C" of
ADEQUATE
WIRING
A Adequate Entrance for Electric Service
B Adequate Circuit Capacity
C Adequate Provision for Outlets, Lights and Switches

In practically all reports the need for more adequate wiring was mentioned and, in most utilities, intentions to make use of the national program material of the Adequate Wiring Bureau were voiced. One of the materials used extensively in meetings with customers was a set of charts, pictured at the left, by which the need for adequate wiring was made dramatic

Oregon

California-Oregon Power

MERCHANDISING will be done in a limited way, according to present plans of California-Oregon Power Co. This is further indicated in the figures as to prewar and postwar sales employees. The company formerly had 60 to 70 sales employees, and contemplated having approximately 20 after the war. It will have possibly two home service employees, it declares also. Its dealer program calls for cooperative advertising and promotion men in the field.

To create new lighting business promotion men in the field will cooperate with dealers and contractors. The same is true of commercial and industrial, as well as agricultural load building. Farm freezers will be emphasized, as will any new major item that the utility feels must necessarily be promoted by it.

Finding that most old houses are not wired heavily enough to handle auxiliary air heaters and do not have enough outlets, the company's advertising will point out the need for adequate wiring. Architects, building contractors and home builders will be contacted to show the need of putting in adequate wiring when new homes are built.

Population in the area served is about the same as prewar and a slight increase is anticipated after the war, with corresponding number of domestic customers and increase in kilowatthour consumption. In a territory where kwh. consumption is already among the highest in the nation at 3,003 per domestic customer, continued increase is significant of the kind of load building done. The company declares however that it intends to work more toward dealer cooperation in the future.

City of Eugene

OUR department does no merchandising. We have done some postwar planning, of course, but it consists of system maintenance and improvements. We have made no surveys dealing with appliance marketing since we do not plan to enter the merchandising field. In fact we have had difficulty in keeping abreast of the power demand on our system, for a number of years, without promotion of appliance selling.

Population during the war has increased about 15% and a continued increase is expected. With it will come increases in customers and consumption. Very little of our present kilowatt-hour sales are war load directly, but perhaps 30% is indirect, that is, because of demands upon sawmills, canneries, farms.—*J. W. McArthur, superintendent-secretary, Water Board.*

Eastern Oregon L. & P.

PROMOTIONAL assistance, advertising allowances, training classes, dealer meetings will be on the program of Eastern Oregon Light & Power Co., Baker, after the war. It will have lighting men working with electrical dealers. Emphasis will be on home freezers, ranges, water heaters, lighting and heavy-duty equipment. Advertising and promotional work with contractors will be done on adequate wiring.

Population in this area has decreased 15% during the war so a substantial increase is expected afterward with increases in both domestic customers and consumption.

Mountain States Power

CONCERNED at the present time with trying to extend rural lines to serve irrigation customers, small sawmills and other services that have a direct bearing on the war effort, Mountain States Power Co., also short of help, has had no opportunity to make surveys or do much planning, according to H. E. Farris, manager of new business and sales. Merchandising will be carried on only in one division and that in ranges only. Cooperative sales promotion and advertising to foster more adequate wiring will be carried on with contractors and dealers. Lighting, heating, adequate wiring and farm service will be emphasized in postwar activity.

Population has increased in the territory, and with it customers and consumption, and is expected to continue. The figures in the table of accumulated demand are estimates of the first year's sales provided merchandise is available.

Northwestern Electric

FULL cooperation with and assistance to dealers is promised after the war in the plans of Northwestern Electric Co., according to James B. Buman, manager residential and rural sales. The company ceased direct merchandising many years back. The company's program in lighting, commercial and industrial and agricultural load building will have personal follow-up backed up by direct mail, radio, window display advertising and promotion. Mass promotion of residential lighting will be done. Adequate wiring will be promoted the same way.

Figures in the accumulated demand table are estimates for ranges and water heaters only for the first three years after war. Population in the territory has increased about 25% and is expected to decline when war work ceases and then return upward later. About 13% of the kilowatt-hour sales of the company are war load.

In the fall of 1941 a survey showed that there were 240 dealers actively engaged in electric consuming device sales. In 1943 it was found that 223 were still active. Many had taken on other lines and others became more active in appliance repairs.

Estimate of the number of residential customers and consumption and revenue for the years 1946, '47 and '48 have been made, using as a basis 2,700 new customers, $387,000 gain in revenue and 36,202,000 gain in kilowatt-hours from present and new customers. Justifying these figures, a careful record of customers by both the utilities in Portland showed that 85% of all new residences connected over a three-year period installed a new or used electric range and over 50% installed electric water heaters.

From a zone analysis for October 1943, Portland district showed 4,863 residential customers in zones of 600 kwh. per month and above and consumed 3,033,866 kwh. or an average of 623 kwh. for the month. Portland has a range saturation of 46% and water heater saturation of 19%; in numbers Northwestern has 12,153 range and 5,020 water heater customers. With all of the new devices such as home freezers, oil burner, circulating fan motors, electric space heaters, etc., to be available in the postwar period, it was conservatively estimated that, in each new home with range, consumption would average 3,000 kwh. per year; those with water heaters and ranges 7,200 kwh. Of the 2,700 new homes, it was estimated that 1,300 would have ranges and water heaters, 955 ranges only and 405 lights and small appliances only, with an estimated annual average of 1,800 kwh.

It is planned to sell 9,500 electric ranges and 4,500 water heaters in the years 1946, '47 and '48, of which 2,295 ranges would be to new homes, 5,400 in present consumers' homes not now using a range and 1,805 to replace old ranges. Of the water heaters sold, 1,300 would be in new homes, 3,040 in present non-users' and 160 to replace old heaters. Summarizing the kilowatt-hour sales expected from such market development, it is estimated that new customers will use 13,074,000; present customers 19,248,000, a total of 32,322,000, leaving 3,880,000 kwh. additional to be sold to 42,000 customers, an average of 90 per customer for three years or 30 per year.

Sales during the years 1938 through the last ten months of 1942 average 2,103 ranges per year for the system, and 977 water heaters and 400 ranges were sold to apartment houses in the same five years. (Further details of this survey, as well as valuable data contained in a newly completed study by R. L. Polk Co. of the Portland market, will be given in a later issue.)

Pacific Power & Light

"OUR plans for the future are still incomplete and the same is true of the postwar survey which was undertaken in 1944 but was temporarily postponed because of the press of other activities. It appears now that we are very apt not to have information along this line until the close of 1945 at the earliest," said D. B. Leonard, commercial manager.

So far it is contemplated to merchandise small appliances and lighting. Population in the territory has remained about the same and a trend upward is expected following the war. Domestic use should increase more rapidly than the population curve, Leonard feels, with a 25 to 50% increase above prewar rate. Approximately 5% of the annual revenue now is from war projects, with 7.5 kw. or more of demand. Estimates of accumulated demand are for the first five postwar years.

Portland General Electric

WE would like to make it clear that the figures on saturation are purely estimates as with single-meter residential rate schedule we no longer have accurate records of the number of electric ranges, water heaters, refrigerators or other appliances in the homes of our customers. The only way to get a correct answer would be to make a house-to-house survey.

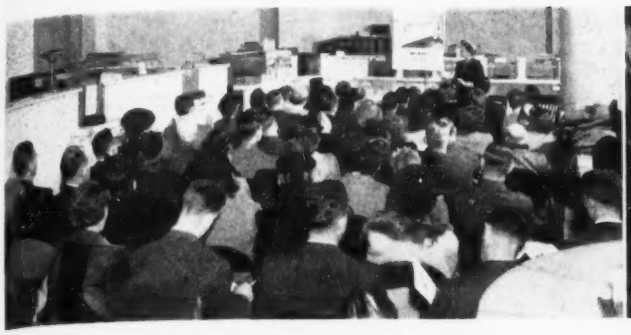
We will not merchandise after the war. We shall have a full-time dealer promotion department similar to prewar. We are not planning to use a lot of home service girls going from house to house promoting residential lighting. Frankly we do not feel that, with our low rates, enough can be accomplished to justify the expense. We further feel that so many people, both men and women, have engaged in war industry work and have thus become accustomed to rather high intensities of lighting and that this will more or less automatically be reflected in home lighting. We do believe it is going to be very necessary to have a force of competent commercial and industrial lighting salesmen, if for no other purpose than to try to maintain or increase existing lighting wattages to prevent decreases through the sale of fluorescent lighting equipment with less wattage than those replaced.

It is our intention, as soon as conditions permit, to extend rural lines into the few areas not now served. We now serve about 90% of the farm homes in our territory, but have a number without service in the foothills of the Cascade and Coast ranges to which we have been unable to build extensions. It will also be our program to promote increased uses of electricity in agriculture to make our rural distribution lines more profitable.

The Portland-Vancouver area in particular has mushroomed tremendously in the past three years. Last year, when we believed the peak of business in our territory was reached, as nearly as we can determine there had been a population increase of 170,000 in that area. It is now believed that in the past year there has been a decrease of about 30,000, leaving approximately 140,000 more people in Portland and vicinity than there were in 1940. While different agencies have tried to determine what proportion will remain, no two sets of surveys agree. We are guessing that Portland will retain about 50,000 and Vancouver area approximately 10,000, making an increase for this area of about 60,000.

It must be appreciated that the principal employment is in shipyards and that the future of shipyards is uncertain. The three Kaiser yards alone employ 92,000 people. In addition there are the Willamette Iron & Steel Corp., Albina Engine & Machine Works and Commercial Iron engaged in ship construction, not to mention eight or nine electric foundries making ship parts and other industries making airplane parts and other materials. If we can find employment and retain 50,000 to 60,000 people, we feel we will be doing well.

This will mean, in our opinion, a considerable residential building program, not only in the Portland-Vancouver area, but in other towns in the Willamette Valley served by us. One reason is that the FPHA in Portland



In preparation for future marketing when appliances and equipment become available, Utah Power & Light Co. has conducted many meetings. Above, a group of future home planners hear postwar kitchens discussed by Mrs. Ardell Welch, home service advisor for the company. At right, an air conditioning program is well attended

alone erected projects to accommodate 19,000 families and additional FPHA projects were erected in other parts of our territory in Oregon. Vancouver, Wash. expanded from approximately 19,000 to around 55,000 and most of this expansion was cared for by additional FPHA housing. While there was quite a large amount of so-called private residence building, retention of 60,000 people will necessitate more, variously estimated from 1,500 to 3,000 houses per year for the first five years to accommodate families who certainly will not remain in FPHA housing if any better is available.

As to purchasing power, we believe the majority remaining will have considerable savings. Naturally a percentage stranded here will have no purchasing power, but Portland's postwar plans, together with state highway construction and other plans, should keep things on a fairly even keel and keep money in circulation.

The replacement market alone, particularly for electric ranges, will be a big item. While we have no accurate figures at the moment, we know that not less than 55,000 and probably nearer 60,000 ranges are now installed on our lines. Half of these electric ranges are over ten years old. Prior to 1942 nearly 30% of those sold represented replacements. In 1941 dealers sold, in round numbers, 9,000 ranges to our customers, which would mean that about 3,000 were replacements alone. In the postwar period this would be greatly increased.

We have every evidence that home freezer units, automatic laundries, clothes dryers, electric water heaters will provide a big market as soon as they are available in quantity.

We think that fluorescent and cold cathode lighting will rapidly replace incandescent lighting, particularly in commercial establishments and will also provide a great volume of business. While we do not hope to be able to recover speedily the load lost by reason of shutdown of shipbuilding and allied war industries, we do believe that the possibilities for residential and commercial load building will be tremendous and that new industries of a permanent type will offset in large measure the loss of war industry loads. —*A. C. McMicken, general sales manager.*

Utah

City of Provo

AN entire new street lighting system is contemplated by the city of Provo, Utah, according to its department of utilities. Its postwar plans call for a cooperative dealer policy, no merchandising itself, assistance to all in industrial and commercial load building, and advertising and field work on adequate wiring because of the increased use of electricity and appliances which require heavier copper to give satisfactory service.

Advertising in 1944 stressed care and use, war effort and postwar themes. In 1945 it will be a continuation of the same policy with this exception. Should civilian products be manufactured, the department is in position to put into effect a cooperative dealer and sales promotion program.

Population in this territory has increased and with it the number of domestic customers and kilowatt hour consumption. About 5% of the utility's load is war load.

Telluride Power

TERRITORY served by Telluride Power Co. of Richfield, Utah, is mostly agricultural. Therefore all merchandise plans contemplate farmer contact and the company will merchandise appliances. Plans otherwise are not yet complete. Quick-freeze domestic cabinets for farm residence use and adequate wiring will be emphasized. Up to 1941 no publicity was given to adequate wiring in this area. As a result, most buildings and homes are not properly wired. Cooperation with contractors and direct mail to all prospective builders will be the program to remedy this situation.

Advertising this year will stress some postwar themes as well as the institutional, care and use and war effort themes used in 1945. Population in this community has decreased 10% and thus is expected to return to normal after the war. Kilowatt-hour trends will definitely go upward as soon as appliances are again available.

Uintah Power & Light

NO merchandising will be done by Uintah Power & Light Co. of Roosevelt, Utah, which declares that it will only work with dealers. "The company is out of the appliance business and is going to stay out," says V. A. Bair, secretary-general manager. Dealer cooperation will be the policy on appliance, lighting, commercial and industrial and agricultural promotion. The wiring in the area is old and inadequate so, with the cooperation of contractors, work will be done to remedy this situation. The establishment of one more very active dealer in the territory is under way, it is reported.

There has been an increase in population and it is expected that after war the trend will continue upward. About 10% of the company's load is war load.

Utah Power & Light

COMPLETE cooperation with dealers, including help in training of dealer sales people, displays, demonstrations, home service calls, etc.; will be the merchandising policy of Utah Power & Light Co. and its subsidiary, western Colorado Power Co., according to W. A. Huckins, sales manager. No merchandising will be done by the utility itself, at least not unless proved necessary.

The lighting program will be in cooperation with the Better Light-Better Sight program. The industrial and commercial program will be to promote all types of service in these classi-

Distribution in Utah Surveyed

UTAH POWER & LIGHT CO.
SURVEY OF POSTWAR WHOLESALERS

Equipment To Be Sold	Number
Ranges	33
Water Heaters	36
Refrigeration	47
Heating & air conditioning	51
Radio	24
Laundry equipment	25
Lighting equipment	28
Vacuum cleaners, dishwashers & disposals, table cookery & other heating devices & other motor devices	50
Farm equipment	41
Wiring supplies	21
Commercial equipment, restaurant, cafe, butcher supply, beauty parlor, shop equipment	23
Misc. machinery & tools & industrial & commercial, etc.	29

Total Postwar Wholesaler Group—100

72 Will act in the capacity of jobbers and wholesalers.
28 Will serve as manufacturers' agents or factory representatives.
63 Of the total will maintain facilities for servicing the equipment which they will sell.

UTAH POWER & LIGHT CO.
THE WESTERN COLORADO POWER CO.
SURVEY OF POSTWAR RETAIL ELECTRICAL INDUSTRY OUTLETS

Equipment To Be Sold	Prospective No. of Dealers	% of Total
Ranges	332	26
Water heaters	332	26
Refrigerators	385	30
Radios	413	32
Heating & air cond. equip.	193	15
Lighting equipment	1,036*	80
Table cookery & other heating devices	553	43
Dishwashers, disposalls & other motor devices	414	32
Laundry equipment	344	27
Vacuum cleaners	294	23
Farm equipment	142	11
Wiring supplies	323	25

* Includes 440 grocery, drug and other stores who will handle lamp bulbs only.

Total Number of Dealers Surveyed—1,290

Approximately 6,950 individuals will be doing sales work in the above stores, either full or part time. Approximately 10% of these people will be outside salespeople and the balance will divide their time between selling electrical goods and other merchandise in the respective stores.

fications, with periodic calls on most customers. A new agricultural department will be set up with a supervisor on the general sales staff and with specialists in all major divisions of the company. Domestic and commercial air conditioning, freezer cabinets, clothes dryers and electric blankets will be given additional emphasis in promotion.

Much of the adequate wiring promotion is already underway. All architects, builders, contractors, material suppliers, etc. and electrical people in general are being brought together in groups to be told the story of adequate wiring and of plans for postwar in this connection. A continuation of this program is to be carried on in the new year.

Advertising in 1944 stressed institutional, care and use and war effort themes. This will continue in 1945, with some increase in budget, stressing electric service in war effort and better living electrically and going into more direct promotion, if favorable conditions arise.

It is to be noted that the customer figures in the table herein are considerably below those in *Electrical Merchandising*, as well as lower than those for 1943. This is not an indication of loss of customers but rather is accounted for by the fact that, in complying with the decision in the rate case which Utah Power & Light has recently concluded, billings have been combined. Heretofore the count was bills. The present count is actual customers.

During the past year the sales department has been engaged in a number of surveys and analyses of factors important to planning for the future and useful both to the company and to the electrical industry—its dealers, distributors and manufacturers. These surveys are of two types—1. of dealers, distributors and service shops, and 2. of customers, domestic, apartment house, commercial and industrial. In the latter category also goes a survey of war housing.

The total results of the dealer and wholesaler surveys are shown in the accompanying tables. Naturally these surveys are much more comprehensive in detail and will provide a source of basic information about each city, town and division served from which to plan campaigns and promotions. The wholesaler survey provides a complete summary of the wholesalers in each division, whether he is an appliance, contracting, general department store, furniture, hardware, jewelry, auto accessory, plumbing, grocery, drug, independent or miscellaneous supply source, and then a breakdown of equipment to be merchandised postwar. The latter includes type, brand name and fuel.

The dealer survey provides information as to every dealer who may handle electrical wares, his personnel, type of business, whether he will do servicing, contracting and what kind and the equipment he plans to sell in detail. The service shop survey was similarly thorough and located 169 firms in the eight divisions of the company, having 195 full-time and 129 part-time personnel. Of these 74 service ranges, 74 domestic, 41 commercial refrigeration, 52 water heaters, 82 laundry equipment, 77 radio, 89 vacuum cleaners, 49 fractional horsepower motors, 24 heavy-duty cooking and baking equipment, 39 single- and three-phase motors and starters and 42 other equipment and appliances. The purpose of this survey was also to determine to what extent the company's efforts to divert repairs to outside agencies had succeeded.

The housing survey showed that an average of 1,553 housing units had been constructed in its Salt Lake, Ogden and Southern divisions per year, at total of 8,500 in Ogden, 4,200 in Salt Lake and 2,330 in the Southern. Of these it was decided that 8,660 would be permanent, 1,070 doubtful and 5,350 temporary or abandoned after the war. Only 10% of these units were found to be cooking with electricity, 1% have electric water heaters and only 36% used electric refrigerators.

In surveying multiple living quarters, or apartments and flats several purposes were in mind. First it was desired to know what equipment was in use, its brands, approximate age, condition and how serviced. Other information as to wiring, and an estimate of what equipment would be replaced first was entered. These will be valuable data for market development later.

Another factor of importance in Huckins' estimation is that apartments are influential on the future habits of young couples, since so many brides and grooms take an apartment before they buy or rent a home and the cooking and household equipment they learn to use has an important bearing on their future preferences.

For the commercial and small industrial customers, the survey sought out information on proposed improvements when materials and labor become available. This included plans as to remodeling, lighting both interior and exterior, air conditioning, refrigeration, commercial cooking and baking equipment and power.

With such groundwork completed

The power companies of the Northwest have been telling the entire nation in large ads like that below in national magazines and newspapers, of the power pool, their part in it, and the opportunities it offers to industries

and ready for immediate use, the sales department feels that it is prepared to meet future conditions as they arise. Population has grown rapidly because of the war industries and military posts in the area served. After the war, a reshift of population back to rural from urban is expected with a shift in domestic customers to match. Postwar consumption is expected to go up, with a 2,000 average annual kwh. consumption by five years after the end of the war with a gross dollar volume of appliance sales of $10,000,000 each year for five years.

Washington

Puget Sound P. & L.

WE had hopes that there would be sufficient merchandise available during 1945 to warrant our setting up a dealer program with a dealer sales director in our general office and one located in each of our seven divisions. Also we had hopes that home lighting equipment would be available this spring and that we might augment our present home service staff with seven additional girls to promote home lighting. In view of the change in the war progress during the past two months, I have about given up the idea of these additions in personnel.

However we are planning to have our home service girls spend more time on home lighting and less on nutrition during the coming year. In view of this intention, we are having all of the home service girls in Seattle for the week of Jan. 22, where they will be given intensive training in home lighting.

During January several other school or training and refresher courses were carried on. In addition to the home service school, we conducted an elementary lighting clinic Jan. 16, an industrial and war lighting clinic from Jan. 16 to 18, an industrial power clinic Jan. 16 to 18 and a farm electrification school, Jan. 9 to 12.

Our merchandising policy after the war has not yet been decided but, when electrical merchandise becomes available, we plan to give the greatest possible aid to dealers. We plan a large increase in dealer contact personnel to assist dealers with their problems, also advertising and sales literature aids to dealers.

Our postwar lighting set-up will have 19 additional lighting employees and we will carry on a customer educational program and a dealer cooperative plan. Our industrial and commercial program will be directed toward assisting medium and small industrial firms to develop plans on reconversion to civilian production when war subcontracting is terminated. As equipment becomes available to civilian production, we hope then to assist our commercial and industrial customers to the fullest utilization of their power and light facilities. We plan a 55% increase in the number of industrial service consultants.

We plan to further aid the farmer to increase production, lessen costs and save labor through greater mechanization and improved practices. We expect to increase the number of farm representatives by 25% to give the farmer greater individual attention. We also plan an enlargement of our experimental laboratory to perfect ideas for the farmers.

At present approximately 15% of the kilowatt-hours sold are to war activities and federal housing. Population in the territory has increased greatly and a decrease is expected but the number of domestic customers may not decrease as greatly as population because many war workers now live in housing projects on master meter. The trend in consumption is on the increase.

Dealer figures in the table are for Seattle only and saturations are estimates only.—*Pat Johnson, vice-president.*

Seattle City Light

OUR enthusiasm for load building in the home through the use of the electric range and automatic hot water tank can best be shown by our annual residence sales increase of 251,631,359 kwh. in 1943 compared to 286,060,445 kwh. in 1944. This further bears out our belief that the range and water heater is a most desirable load and has greatest potential possibilities. At present the estimated population of the Seattle area is 510,000. It is certain that we will retain a large percent of this wartime population regardless of the adjustment period.

In 1939 the average annual residence kwh. use was 1,492. In 1943 this average use was 2,993 kwh. At the end of 1944 it was 3,246, with an average annual revenue per residence customer of $49.77.

We estimate our 1948 average annual residence kwh. will be 4,500. This increase is based on the premise that approximately 30,000 automatic electric hot water tanks will be installed on the lines in the next five-year period, bringing our total to approximately 50,000.

Of the approximate 88,000 residence customers, we have more than 55,000 using electric ranges, 20,000 plus using automatic tanks and upwards of 15,000 using other electric water heaters as auxiliaries to waterback coils.

We estimate that approximately 10,000 new homes will be built and wired to use electric cooking and water heating. Also approximately 7,500 old homes will be wired for electric range and water heating. Additional tank installation will replace side arm heaters with coils in furnace combination.

A large per cent of both new and rewired homes will have thermostatically controlled electric space heating equipment installed in bathroom and kitchen.

To accomplish our load building objective in the residence field, we will foster adequate wiring and auxiliary space heating together with range and water heater tank. We will encourage the use of the 50-gal. automatic electric hot water tank as the minimum size to install in the home.

Before the war we had made a fair start in encouraging the use of commercial electric cooking and electric water heater equipment. We will continue to be active in this field.

We will merchandise ranges and automatic electric hot water tanks and commercial cooking equipment. In addition, we will use dealer contact men to help dealers in proper installation details of equipment. An active sales program of sales training for dealer salesmen will be carried on and we will assist dealers in the promotion of the automatic washing machine and automatic clothes dryer.

In lighting, we will continue our present customer advisement service, showing the advantages of higher levels of illumination in homes, business offices, stores and factories.

Advertising in 1945 will stress the advantages of our all-electric residence rate, of automatic hot water heating in the home using the 50-gal. tank as the minimum size. Also will be stressed the advantages of commercial electric cooking and water heating equipment.

While population has increased about 30% and may go down 10%, an ultimate net gain of about 10% of the 1940 census is expected. Domestic customer totals are not expected to decrease as the greatest proportion of the new population is now living in government housing projects, hotels, boarding houses and in apartments, none of which affect our domestic accounts. There will be a continual increase in kwh. due to the acceptance of the range and hot water tank.—*P. C. Spowart, sales manager.*

City of Tacoma

POLICY as to merchandising is as yet undetermined, the department of public utilities, light division, City of Tacoma, sometimes called Tacoma City Light, declares. However the need for adequate wiring is expected to result in cooperation with the National

Sheridan, Wyo., Survey Indicates What People in Small Cities Want

	Present Time		After War	
	Have	Do Not Have	Need	Do Not Need
Home Freezer (food storage)	8	198	97	73
Electric refrigerator	191	93	121	64
Electric range	55	165	73	89
Electric water heater	10	178	40	95
Washing machine	246	45	127	65
Radio	289	15	113	61
Adequate lighting	194	61	66	60
Iron	284	16	96	70
Ironer	38	156	45	84
Vacuum cleaner	187	80	125	60

Other appliances intended to acquire

Food mixer	42	Electric brooder	1
Electric razor	6	Electric dishwasher	7
Wood working tools	1	Electric hairdryer	1
Electric grill	11	Bread Toasters	57
Electric percolator	9	Electric pumps	4
Electric sandwich toaster	4	Stokers	1
Fans	4	Feed grinders	1
Waffle iron	35	Milk separator	1
Electric sewing machine	10	Milk sterilizer	1
Motors	4	Floor lamp	2
Electric heaters	4		
Electric pads	4	Have enough outlets	130
Electric roaster	7	Do not have enough outlets	190

Adequate Wiring Bureau and increased advertising on the subject. Emphasis will probably continue on ranges and water heaters, with possibly dryers and freezers added.

Part of the 1943-44 increase in kwh. consumption per residential billing may be due to the fuel shortage, the department explains, resulting in increased use of electric heating. Part may be due to the housing shortage resulting in doubling-up in homes and a corresponding increase in consumption per billing. A return to normal conditions may bring a temporary decrease in the trend, but it is expected to increase again thereafter. Population has increased about 25% and may decrease about 20% after the war. Commercial firms have decreased during the war but will increase after the war again.

Washington Water Power

SURVEYS we have made indicate that after the war population growth in our area will be about 15,000 above the 1940 level, which indicates to us that in the neighborhood of 7,500 new homes will be built in the first five years after the war. At the present time our per capita buying power is estimated at $2,252 per year, which is relatively high and, of course, we hope it can be maintained, although that is somewhat questionable.

Our plans call for merchandising after the war but with cooperative advertising and sales programs and other dealer assistance, including store and window display material, demonstration and sales training assistance, merchandising consulting service.

In wiring, we plan a complete tie-in with the national bureau promotions, with extensive local promotions bringing in all agencies affected. As new appliances are developed, special promotional programs will be developed to fully promote their services.

A crew of all-service commercial representatives in sufficient numbers to assure calls on every customer at least twice a year will be on the staff. These men will be, for the most part, engineering graduates, thoroughly trained in the application to the needs of our customers of modern electrical appliances and equipment.

Our postwar plans call for an expansion of industrial sales activity. Primarily, it will be aimed at encouraging new plants to locate in our territory and existing plants to expand, both as to size and as to types of products. In divisions other than Spokane, industrial customers do not exist in sufficient density to justify the use of full-time industrial representatives. In such cases, the local commercial representative will make the field contacts.

Lighting will tie in with national programs with intensive company-dealer promotions for all types of lighting.

The program promotes all agricultural services, including electric drive machinery, quick-freeze and hold-over storage, brooders, infrared and sterilizing lamps, farm home and outbuilding lighting, adequate wiring, etc. We will cooperate with manufacturers, distributors, dealers, farm extension departments of colleges, county agents and farm groups.—*R. B. McElroy, general sales manager.*

Wyoming

Sheridan County Electric

THIS utility discontinued merchandising in 1939 and does not intend to resume after the war but will assist dealers with advertising both of a dealer-help and institutional character in both newspapers and radio. Emphasis will be given to water heating especially. Population in this community has not increased.

As an indication of appliance saturation and preference in a community of this size the figures compiled from a survey conducted for the Rocky Mountain Electrical League in September is of interest. Questionnaire cards were sent out to 3,000 customers. From the 341 returned cards, the results shown were tabulated by Thomas W. Hughes, president and manager.

Canada

B. C. Electric Railway

PLANS of the B. C. Electric Railway Co. Ltd., both for the mainland from the Vancouver main office and for Vancouver Island at Victoria, are still incomplete. The company will do some merchandising, with limitations, it has decided. Final plans are not complete but such merchandising will be on a basis where dealers will receive help from the utility in cooperative campaigns, promotions, displays, etc., and in sales training provided for dealer employees.

Under the Red Seal symbol for adequate wiring promotion, a continuous program is carried on. Experience shows that when adequate wiring is not promoted, service and outlets installed are less and neither electrical or building contractors are interested in promoting it.

Postwar promotion will continue to emphasize electric water heaters as well as ranges, and home freezers will also be featured. Population has increased about 15%. It is anticipated there may be a slight reduction for the first two years, followed then by a gradual increase. Domestic customers, however, should show increase as home building will develop faster than population increase. There is much doubling up of families and many live in poor houses with poor accommodations. Domestic kilowatt-hour consumption should be upward. The kwh. figure in the table excludes the flat rate water heaters.

One important factor which has affected business during 1943 and 1944

has been the action of the Provincial government's Public Utilities Commission in awarding one month's free energy during each year to residential lighting, commercial lighting, small commercial power and street lighting customers. In 1944 the free energy period was from Nov. 20 to Dec. 20. It amounted to almost 26,000,000 kwh. and affected 129,000 accounts. These figures refer only to the lower mainland system around Vancouver.

As an indication of the company's attitude to postwar problems it has set up the following new departments: 1. public relations, 2. personnel—to handle employees' relations, 3. industrial development—to encourage new and existing industries.

Hawaii

Hawaiian Electric

AIR conditioning, deep freeze units, commercial cooking and refrigeration will receive special emphasis after the war by Hawaiian Electric Co., according to C. E. Nolan, commercial manager. Otherwise its program, except that it plans to merchandise again, is not yet complete. For adequate wiring promotion it intends to work through electrical contractors in the territory served.

Present population is considerably higher than prewar but not all of this is reflected in domestic customers owing to the nature of war work. The trend upward is expected to continue and with it the number of domestic customers. An increase of approximately 10% per year for five years after appliances become available in any quantity is predicted for domestic kwh. consumption.

Sales to customers affected by war activities have greatly increased but much of this new load since the war should be retained as permanent future load. Only about 10% of this load is expected to be lost after the war.

Instead of the annual exposition, this ad reminded of it, promised one again

San Diego Bureau

Reviews 1944 and plans program for this year

SAN DIEGO electrical appliance dealers and distributors may face increased manpower, shipping and dealer expansion problems during 1945, predicted J. Clarke Chamberlain, secretary manager of the Bureau of Radio and Electrical Appliances, in making his annual forecast of the appliance situation for the coming year.

"We can now clearly foresee for San Diego an increasing manpower headache for the months ahead," he continued. "Governmental pressure from two directions—Selective Service and manpower control—will be exerted to thin out male help in many of our establishments. However, we still believe that essential service personnel will not be disturbed."

As the Pacific war tempo increases, freight shipments to San Diego will become gradually slower, Chamberlain warns. "Although we now complain of shipments being very slow, it is likely that before the year is out war demands on rolling stock to the West will be so great as to prevent our receiving merchandise from the East that otherwise would be available for our dealers.

"Returning servicemen, instead of going to work for others will, in too many instances through the G. I. Bill of Rights, decide to go into business for themselves. While a reasonable number of such applicants for dealer or service dealer franchises can be assimilated, we predict that in this territory there may be two or three times as many such applicants as could be accommodated with a profit opportunity. We foresee the need of an industry-wide program of information for the benefit of returning servicemen to prevent the failure of many."

San Diego distribution set-ups may undergo a marked change during 1945, prophesies Chamberlain. "It is our opinion that a number of firms which formerly covered this territory by sending salesmen down from Los Angeles will either establish resident salesmen with warehouse facilities in San Diego, or will, when conditions permit, open branch offices in this community."

Referring to the present radio tube shortage, the San Diego bureau manager said, "Radio tubes for civilian use will continue to reach us in trickles for at least the next six months, and probably longer. Despite the present difficulties in obtaining tube replacements, we believe the months ahead will be the darkest in this respect.

"The Bureau's program of activities for 1945 has in no sense been completely scheduled by our board of directors," said Chamberlain. "Following the practice in other war years, our program will remain in a fluid state so that it can be quickly shifted by the board as changes in the national or local situation might warrant. However, we can tell now of some things that have to do with our 1945 outlook.

"Beginning with advertising, we expect to have even more money available for this purpose than the very considerable amount spent last year. Plans already made call for a large advertising expenditure for the long-range adequate wiring campaign to begin soon. Also we can assure our members that every appliance will again come in for its share of advertising and promotion.

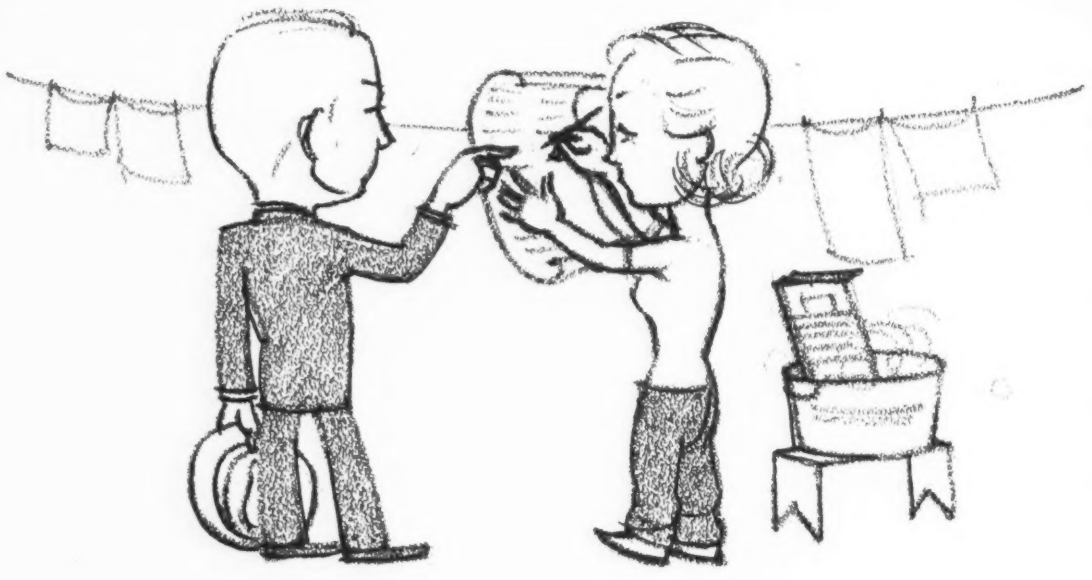
"*Adequate Wiring* is one of our most important campaigns. In numerous ways, the various elements of the electrical industry will be brought together to insure the best possible attack of the program of adequately wiring the new homes to be constructed here, and of modernizing from a wiring standpoint, the vast number of existing homes that virtually cannot add a single major appliance safely to the present load, until wiring capacity is increased.

"*Home Planning Institute* will continue to be a major activity of the bureau, with every facility of our organization being thrown into this tremendously worthwhile country-wide project.

"*A Product and Dealer Directory*, perhaps the first of its kind in the nation, is now under preparation. It will carry a complete listing of all distributive agencies doing business in our territory, with names of the appliances they will handle. It will also have a full listing of our dealers and service dealer members of San Diego County. Free copies will be available to all our members, before Feb. 1.

"*Meetings and Conferences*, as usual, will be among the regular activities of the bureau. Again the Spring Conference will be held in May, with the annual meeting in November. Other meetings will be held as the need arises.

"Other 1945 objectives will have to do with employment of veterans who left our industry or who intend to become associated with appliance merchandising in some way; extension of the Sub-standard Appliance Ordinance to all county towns; continuance of radio training programs in cooperation with the vocational school, etc. Looks like another very busy year ahead!"



DEALERS—Roll Your Own Planning II

A FEW irons finally made. Other appliances will come. Spot authorizations are beginning to be made. To be sure, the time for limited civilian production has been pushed farther down the line by the setbacks on the war fronts in Europe. But not for long, once the tide is turned.

One of the ways to make the *best* of it is to sign up as much business as possible in advance. Sort of a priority list of your own for your own customers. It has a lot of advantages—

—keeps your customers feeling you will take care of their appliance needs as soon as you can.
—commits them to come to you first—at least give you a chance at their business when merchandise comes back.
—gives you a right to call and interest them when that old closed door with a "no salesman" sign returns, for they've asked for it.
—helps you estimate your own market, so that you can order stock more accurately.
—keeps you in touch with the manufacturers. Many of them offer such priority plans complete with letters, literature and display material you can employ.

Then there's your good will to maintain, your store traffic to keep coming, your place in the neighborhood or community to uphold.

How it's done—for dealers

—First as an alert dealer you will sign up with your supply sources to insure your quota of the appliances as they are made.
—You'll inquire if the manufacturer has a sign-up or a priority plan and, if possible, make use of it.
—You'll let your old customers know that you are taking orders. Do that by telephone, by mail, by ads in the local papers, by slides in the neighborhood movie houses, etc.
—Keep a file or a record book list of them by appliance and name of the customer. Maybe assign a number to each, so that the first to sign up will get the first appliances.

The information you can obtain under these circumstances may be of great future value. Why not ask what appliances the customer now has, their age, condition, and keep a record of that too? Makes a fine prospect list for the future.

How it's done—for contractors

If you are a live wire in the wiring business this system can be made to work for you too. May have to make up your own plan, but that's not hard to do.

—Go through the list of customers you've done repairs and alterations for during the past few years.
—Check to see if they still are living there.
—Use your knowledge, or that of your electricians, of the premises to judge what is still needed in the way of extra outlets, new circuits, a new service, circuit breakers, three- and four-way switches, yard lights, basement or attic lights, closet lights, etc. Put that data on your card or in your book.
—For your store and industrial customers, do the same thing.
—Let your customers know you are gearing up to take care of those deferred repairs and alterations, that modernization work they'd like to do when material and manpower are available again. Tell them by phone, by letter, by postcard, by mailing piece, by ads.

Construction work may loosen up sooner than appliances are available. So be prepared for an earlier reconversion, modernization and expansion.

Like the First Aid books say—it's "What to do 'til the doctor comes"—Apply First Aid to your own planning. It will give you a lead on the field.

Prepared by Pacific Coast Electrical Association Planning Committee

Short Ends

Useful to those doing wiring and inspection

A sales control ordinance prepared by the Electrical League of Utah and the city electrical inspection department of Salt Lake City has been approved by the commission, Jan. 16, after about a year of work.

The ordinance covers the electrical materials and devices used in interior wiring installations operated at 250 volts or less, lighting fixtures and portable lighting equipment, except bulbs or tubes, electrically heated cooking equipment for household use and other electrically heated appliances not exceeding 10 kw., toys, radio sets, electrical appliances, electric cords and cord sets, portable electrically illuminated signs and portable motion picture projectors, transformers operating at 100 volts or more.

The ordinance also calls for the rating of appliances on materials and tags and follows the usual procedure as to standards and evidence of compliance when listed or labeled by Underwriters' Laboratories, Inc.

Eliminate Inadequacy

The Elimination of Inadequate Wiring in the Postwar Period, a report of the postwar committee on that subject of the International Association of Electrical Inspectors, has just been published as a supplement to the January issue of the IAEI News-Bulletin. The committee has as its chairman J. Hyde Stayner, Utah Power & Light Co., meter superintendent, who was president of the Northwestern Section, IAEI, last year. F. H. Murphy, Portland General Electric Co., and Jared A. Hill, Pacific Gas and Electric Co., are two other Western members on the committee.

The report covers the reasons why a program is needed, the existing conditions in residential, commercial and industrial wiring installations, lists many of the appliances and services which will require more adequate wiring in the future, analyzes why existing installations are inadequate, makes a number of suggestions for improvement, summarizes what adequate wiring means to all in the industry, suggests reinspection and other means of tackling the problem and ends with five recommendations:

In brief these are 1. Join industry promotions, 2. assist in local educational campaigns, 3. publicize the advisory services of the inspector, 4. make certification of plans a prerequisite to awarding building permits, 5. improve the safety provisions of the National Electrical Code by increasing minimum standards toward an adequate basis.

● QUESTION as to whether it is illegal to use a pricing guide published by an independent company unaffiliated with the user has been raised by a recent Federal Trade Commission order against a group of printers in North Carolina. Opinion is expressed by Biddle Trade Bureau, of Los Angeles, publisher of two such pricing services, one for retailers and contractors, the other for wholesalers, that the ruling does not bar the use of such guides. The order, it is pointed out, does not prohibit an individual from using such a price book if he desires but it does prohibit him from agreeing with one or more of his competitors to use the price book. When a subscriber purchases such a service it carries no obligation that it will be followed. The guide is furnished for information only and any use or non-use is the buyer's own prerogative.

● DRAFT of all men physically fit under 30 years, even though previously classified 2-A or 2-B is underway and only the most highly essential of the most critical industry personnel are likely to be further deferred. Quotas for February and March are so high that most draft boards have little choice but to send all men within the 18-30 age group for preinduction physical examinations. This demand for men is likely to affect electrical contractors engaged in war construction if it can be held that any man they have in that age group can be replaced at all. Advice has also been given that men in the 30-38 group be surveyed also as to their essentiality although present orders do not affect their status.

● WHOLESALERS inventories of wiring materials, while greater in general than in previous war years, are often short on some important items while long on others. Shipments are slow in replacing of stocks, also. Rigid conduit, being sold under ceiling prices for some time, seems due for a 5% increase, but will still be 5% below frozen ceiling.

● THEFT of electric wiring and fixtures as well as plumbing fixtures from houses under construction has become such a problem in Vancouver, B. C., that builders are considering erecting high fences around houses under construction. It was estimated recently that theft and damage totaled over $5,000 during the year.

Low Construction Year

Lowest volume of construction since 1935 is forecast for 1945 by preliminary estimates of volume in the United States, based on the assumption that war on both fronts will continue throughout the year. A total activity of $3,250,000,000 is what the War Production Board, which controls the materials, has estimated.

This is 82% of the 1944 volume and 24% of the peak 1942 performance. Almost half of it will be privately financed work as contrasted to 40% in 1944 and 20% in 1943. Military construction is expected to be a third less than 1944, both in industrial and non-industrial. A 7% increase is expected in privately financed factory construction. Residential and housing construction will decline 28%, according to the estimates.

● CLARIFYING the L-123 order restricting sales of fractional horsepower motors, WPB emphasized that no motor is to be sold or *bought* (for both buyer and seller are subject to the regulation) except on an order bearing a preference rating of AA-5 or better. Only exceptions are sales on a farmer's certificate of purchase provided for in PR-19, and delivery of a new motor to a householder or other user for replacement of a damaged motor, taking the damaged motor in return and repairing it for resale.

● GREAT demand for cotton has put further restrictions on use of cotton tapes and sleevings for motor and transformer repairs but ample stocks of Fiberglass insulating tapes and sleevings for this purpose relieve this situation. Military requirements for combat wire take all available cotton for insulation.

● FOR A STUDY of the relationship between illumination levels and scholarship in classrooms on a scientific basis, the Illuminating Engineering Society research fund has been given $5,000 by the F. W. Wakefield Brass Co., makers of lighting fixtures. Previous tests have not been generally acceptable to some school authorities as having been conducted in an entirely scientific manner.

● PREFABRICATED homes are contemplated in plans of the Homasote Co. in what it calls Precision-Built houses which will be merchandised through large department stores like Frederick & Nelson, Seattle, and Barker Bros., Los Angeles. J. F. Barrett, of Barrett & Hilp, San Francisco general contractors, is chairman of the board of the company.

ELECTRICAL WEST

McGRAW-HILL COMPANY OF CALIFORNIA
68 POST ST. SAN FRANCISCO 4

The all-industry magazine of progress, established 1887 and incorporating the "Electrical Journal," "Journal of Electricity, Power & Gas" and "Journal of Electricity." Contents Copyrighted.

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A Job Well Done

JUST how completely war shuffles all of the cards affecting an industry is revealed in the reports in this issue which detail the Far West's electrical position as the war starts its fourth year. The electrical industry has done a superb production job—in power, in equipment and in making the installations so that other industries might produce. This tremendous task has been accomplished in the face of diversion of essential materials and parts, shortages of equipment and manpower, emergencies of every conceivable character and a shuffling around of sources of supply. In the confusion of concentrating on war, some prewar customers have been lost and some new customers gained. The full impact of the displacements cannot be appraised until the war is won. And until the war's urgent demands are met fully, there can be no diminution of production of anything.

However, since there is growing belief that the time for war will run out in 1945—at least on the continent of Europe—the industry must and is giving some thought to the future. Reconversion and new plans as well are going to depend in a large measure on how victory comes. A sudden victory will present one set of problems. A gradual building up of favorable turns, will mean another strategy. One cannot but read the reports in this issue without concluding that the electrical industry will be ready for either eventuality. In the meantime, until the last knockout blow, it is our job at home to continue backing the armed forces the limit of our capabilities. That the electrical industry can and will do.

Postwar Job Reservoir

EACH day that the war continues adds another job to the backlog of postwar tasks for the engineering and construction men of the industry. Study of the reports on utility plans presented elsewhere in this issue reveals the variety and magnitude of the accumulating workpile. With roughly 1.5 million kilowatts of war load to be dropped ultimately, one might think that all thought of new generation would be forsaken for several years. On the contrary, a number of agencies are planning new units and new projects.

Noteworthy, too, is the thought being paid to the most economical means of distributing the war-released energy to new customers. Distribution expenditures of the order of $300,000,000 will be required to provide marketing facilities for surplus capacity. Similarly, the announced plans of many utilities in the West to take power to every rural resident in their service areas adds to the postwar workpile. As the war continues, deferred maintenance continues to pile ever higher, and with it, proportionate increases in reserves are accruing to finance this activity.

When its war job is finished and manpower and materials are once more available, the electrical industry here in the Far West will embark upon record-breaking construction programs. Theirs will be a tangible contribution to the postwar job reservoir.

Prostituting Regulation

POLITICAL effect should have no place in the administration or functioning of the state regulatory bodies which establish the rules and rates governing public utilities. Unfortunately the recent trend to prostitute many governmental functions in the name of "good politics" seems to be invading this field to a degree comparable with the degradation of some of our national regulatory bodies. Particularly obnoxious are the efforts of certain special interests to foster candidates for the state regulatory agencies who will be especially sympathetic to their beliefs or platforms. The efforts of the Washington State Grange to influence the selection of the utility commissioner in that state is a case in point. The Grange wanted a commissioner who would follow the line of state ownership of public utilities which it advocates. It will be a sorry day for ratepayers and public if this tendency persists. Such prostitution of state regulatory bodies to promote selfish interests is in sharp

contrast to the democratic conception of the duties of these agencies. Their job is to reconcile the differences between and protect the interests of ratepayers, security holders, public and the utilities themselves.

More of the Same

WHILE on the subject of political effects and regulation, a word might be said of the efforts of some commissions to make capital out of rate reductions involving elimination of so-called "excess profits" tax payments by utility companies. The Far West has not been blameless in this respect. Just recently the Cincinnati *Enquirer*, in characterizing such a move in that community as "tawdry politics," said: "We are paying war taxes on a great many things. If someone thought up clever little schemes to deprive the government of tax revenue on everything from electricity down to theater tickets — excusing each instance on the ground that 'other people were doing it' it would not be long before the war effort would collapse in a snowstorm of IOU's." The paper calls the Cincinnati deal "a shabby effort to make a rate showing for political effect."

Commercial Backlog Grows

BEST proof that America is essentially a commercial nation, that its people are traders and business minded, not military and war minded, is to be seen in the way business hope keeps bubbling up through the volcanic mud of war. Americans are impatient to get the war done with so that they can return to the cleaner maneuvers of business and trade.

All last year the preparations, mental and material, as much as possible, for a return to trade were being made. On every hand, it was "postwar planning." The break-through of the Belgian Bulge dashed icy water on such hopes, but they are bubbling again for they really cannot down.

In a sense such hopes are the essence of why we fight a war—to keep alive the opportunities of free men to trade and do business with one another. A rigidly controlled economy is intolerable to men of spirit and enterprise.

Had it not been for the newest regulations to discourage meetings and conferences because of critical transportation and hotel facilities, this spring would have seen a resurgence of group gatherings to prepare plans for business. A few spot authorizations for manufacture of a few irons, vacuum cleaners, washers, ranges, water heaters, refrigerators, electric heaters and portable lamps provided outlets for the bubbling hopes of business.

Meanwhile much of the logistics of the electrical business has been plotted. Manufacturers of appliances, wiring materials, electrical equipment of all kinds, have been surveying markets, planning production, distribution and representation. Dealers and contractors have been looking their own premises over, planning changes, improvements, investigating new fields. And the utilities too have turned their manpower, what they have remaining, to analysis, to study, to plotting and planning, to gathering information. They have been searching out trends and changes in the market by reason of new population and new industry that has come to the West with the war. This arsenal of information they are preparing for their fellow businessmen to use—the dealers, contractors, wholesalers, distributors, manufacturers.

It is a good thing for America that this commercial spirit, this enterprise, will not down, not even in war. The future might be black, indeed, if men lost hope of the opportunities for fun and zest and profit and advancement that business provides in normal peacetime life.

WE must, as Americans, determine the proper position of government in relation to our people. What is government? The servant of the people, or are the people the servants of government? That is the thing which is going to determine what kind of an industrial system we are going to have, what kind of a standard of living you're going to have, who the employer is to be, and what kind of an opportunity Americans are going to have. What is going to be the position of government relative to the individual? On that our whole future rests. Unfortunately, theorists in government feel that they know just how to run government so as to produce Utopia. But the operation of an industry, as the industrialist knows, is one of the most intricate problems that man handles. It is obviously impossible to operate industry by rule. The only way, however, that government can run any activity is by dogmatic direction. That must fail in industry as we so clearly see now. It is not because of, but in spite of, bureaucracy that we are the arsenal of democracy. The record of American industry in this war is the greatest triumph ever achieved by any people. . . . Why is it that America, with a population ten per cent of the allies, can do that? It is because of the American industrial system and the genius of the American industrialist. Remove him from this picture and the chance of victory for the Allies in this war would have largely disappeared.—James F. Lincoln, president, The Lincoln Electric Company.

When Joe Comes Home Again

Personnel men of Northwest utilities exchange plans and methods for employment after the war

EMPLOYMENT of veterans, with particular attention to the handicapped veterans, was the subject bringing forth the most discussion at the Personnel Conference of the Northwest Electric Light & Power Assn. in Spokane, Jan. 24 and 25. Utility personnel managers and directors from the larger utility companies of the Pacific Northwest were present, under the chairmanship of C. W. Sherman, Puget Sound Power & Light Co., Seattle.

The conference was the second held in recent months and was featured by the reports of six committees that have been gathering material since the last conference.

With respect to returning veterans, the postwar planning committee with R. H. Sessions, Idaho Power Co., Boise, chairman, recommended that personnel departments study the manpower requirements estimated by each department of the company and prepare a prospectus of possible transfers, promotions and upgrading procedures to meet the total estimated requirements. Each company should prepare a written policy relative to the employment of veterans that would have a common understanding by the management, the present employees and any unions that might be involved. Each returning veteran should be given special consideration for the possibility of being upgraded to that employment or position which he logically would have attained had he remained with the company.

A plea that the companies survey their jobs with the idea of seeing how the handicapped veteran could be fitted into the organization, was offered by Hal K. Boynton of the USES, Spokane. It was agreed by the delegates present that many regular and some special jobs in utility companies could be handled by veterans suffering physical handicaps. All agreed that mental conditions of certain returning veterans would have to be studied carefully, with sympathetic understanding of the problems involved in aiding such men to adjust themselves to civil life.

Rex J. Raymond, member of a local draft board, addressed the group on the subject of selective service, pointing to the increased calls on draft boards for inductees. He stated his opinion that, for men under 30 years of age, only those regularly employed in essential occupations with critical skills and who cannot be replaced will be deferred, except that men will be inducted only as it becomes necessary to meet calls. The committee report on this subject, presented by G. B. Bocarde, Pacific Power & Light Co., recommended that each company file occupational certifications for essential employees under 38; review the current status of employees subject to limited service or who are disqualified for military service, especially in the younger age group; and keep in as close touch with local selective service boards as necessary.

Much interest was displayed in the report of the committee on pensions and insurance, presented by L. K. Snyder, the Washington Water Power Co., chairman, which tabulated the several plans in effect among the member companies. It was pointed out that the number one item of things that worried the rank and file of employees was security for old age. Generally speaking, employees wanted something from the company besides government social security, and the institution of a pension plan had a good effect on company morale.

The report on physical examinations for employment, age limits and other conditions of employment, by A. O. Mangold, Northwestern Electric Co., chairman, brought forth considerable discussion due in part to the variety of plans and policies in effect among the member companies. There was agreement that physical requirements should be set up and adhered to and that waivers, though frequently resorted to, probably would have no legal effect.

Sick leave compensation, medical aid and hospitalization was another group of related subjects bringing out controversial points, as reported by D. R. McClung, Pacific Power & Light Co., chairman. It was recommended that there be a definite policy on sick leave pay in writing so as to avoid discrimination.

Company policies in administering accident prevention and safety work were reported by J. T. Bradshaw, Puget Sound Power & Light Co., chairman. Renewed interest was expressed in accident prevention meetings, reports, and closer control of safety work through the personnel office.

A new method of evaluating jobs for the purpose of setting equitable salaries and seeing whether jobs are within the capabilities of certain employees was outlined by Fred R. Groch, Portland General Electric Co. The method involves tabulating the degree and assigning point values to a number of factors, such as education and experience needed to hold the job, supervision exercised and received, complexity of work, working conditions, hazards involved, and seriousness of mistakes. This method helps establish a ceiling for the salary applicable to the job and helps fix the qualifications of those presumably in line for it.

At the close of the meeting, R. H. Sessions was appointed vice-chairman of the conference and provision was made for the continuation of much of the committee work that had been started, with the idea of reporting again at a similar conference in six or eight months.

● HARRY HILPERT and N. J. SIGGINS, appointed recently by President Brown of the International Brotherhood of Electrical Workers, as members of a five inspector advisory committee to the IBEW member on the Electrical Committee of NFPA, the body making the National Electrical Code, have returned from a recent meeting in Chicago of that committee. Hilpert is state electrical inspector, state of Washington, Seattle, and the president of the Northwestern Section, International Association of Electrical Inspectors. Siggins is electrical inspector in the Department of Electricity, San Francisco, and immediate past president of the Southwestern Section IAEI. David Talbott, chief inspector of Chicago, is chairman of the advisory committee, and W. J. Canada, formerly of the Bureau of Standards, has been made consulting engineer for the committee.

Fluorescent Lighting was injected into the usual Code study of the Rocky Mountain Chapter, International Association of Electrical Inspectors at its regular meeting, Jan. 23, in Denver. Harry Schockett, of Schockett Electric Co., was speaker. Next meeting for Code study is scheduled for Feb. 26, according to V. C. Moulton, chapter secretary.

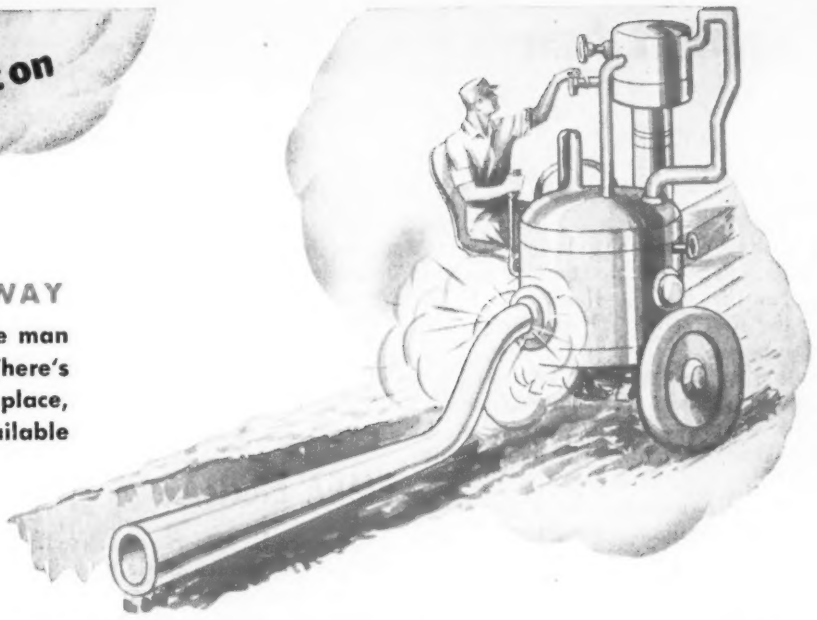
Puget Sound Chapter, IAEI, recently heard J. G. Miles, Jr., Westinghouse Electric & Mfg. Co., speak on *Better Wiring for Better Living*. The quarterly chapter meeting is scheduled for March 2 at Tacoma.

Southern California Chapter, IAEI discussed inspectors problems at its meeting in Laguna Beach on Jan. 31.

Greater Central Valley Chapter, IAEI, was to hold its annual dinner at La Rosa Restaurant in Sacramento on Feb. 6.

Wartime Rackets were exposed at the San Diego Electric Club meeting on Jan. 2, when F. D. Ide, manager of KGB, told of those uncovered by the Better Business Bureau and including schemes in operation and those planned for use on service men postwar.

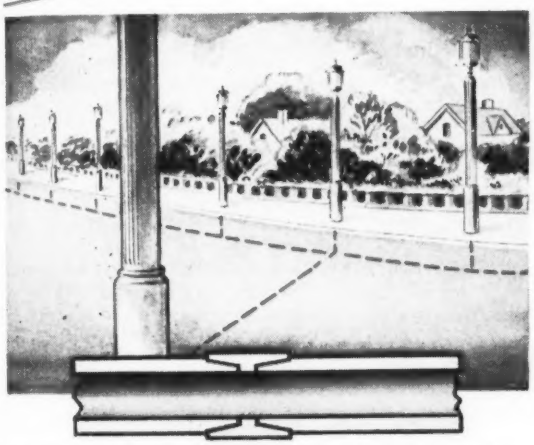
Post-war pipe dreams you better not count on



AN UNDERGROUND RACEWAY THAT'S EXTRUDED IN PLACE—One man makes the conduit, and lays it as well. There's no handling, no joints. Once it hardens in place, you can forget it forever. It may be available some day, but it won't be tomorrow!

BUT RIGHT NOW YOU CAN PLAN TO—

SPEED UNDERGROUND WORK WITH NOCRETE CONDUIT



Nocrete Conduit cuts costs on new street-lighting installations

ORANGEBURG Nocrete Conduit, the ideal raceway for underground cable or wire, is easily handled and installed. Its flexibility enables the duct to follow the contour of the trench, and because it does not chip or break easily, handling losses are at a minimum. Joining requires no compound, and fibre can be sawed to length and field tooled for joining.

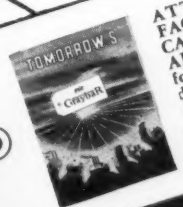
ORANGEBURG'S smooth inner surface reduces cable pulling tension, and prevents damage to cable sheath.

Tight sleeve joints and impermeable walls make ORANGEBURG highly resistant to the entry of fluids. Your Graybar Man will be glad to help you select and apply the right ORANGEBURG conduit for your particular needs.

GRAYBAR'S NATIONWIDE NETWORK

of more than 80 warehouses assures you a convenient local source of supply for more than 60,000 electrical items — backed by experienced power transmission and distribution application aid, plus assistance on problems of lighting, wiring and communication. A Graybar Man near you is ready to make your electrical supply problems his personal responsibility. Why not take advantage of his time-saving assistance? 148

via GraybaR



ATTENTION — MANUFACTURERS OF ELECTRICAL EQUIPMENT AND APPLIANCES: To help plan for more efficient post-war distribution — national or regional — write for this new booklet: "Tomorrow's Electrical Distribution — via Graybar."

GRAYBAR ELECTRIC COMPANY
IN OVER 80 PRINCIPAL CITIES
Executive Offices: 420 Lexington Ave., N. Y. 17, N. Y.

Relight America

IES president tells Western industry groups

AMERICA must be relighted within ten years, relighted for the second time in the history of electric light. For the first relighting was necessary at the advent of the carbon lamp. Yet, was that truly relighting? It was merely dispelling darkness. The relighting ahead must do in ten years what it has taken 20 to bring to the present stage.

With this message as a keynote, Samuel B. Williams, president of the Illuminating Engineering Society, addressed groups of IES and electrical industry people in Spokane, Seattle, Portland, San Francisco and Los Angeles from Jan. 8 to 15, and in Denver, Jan. 18. Covering so extended an area in so short a time, Williams, who is editor of *Electrical World*, also managed meetings with boards of managers of chapters and sections and calls on utility executives.

IES President Williams brought a thorough and detailed knowledge of that society's policies, program, operation and ideals, but he also came definitely to carry back to its council the ideas, wishes, organizational problems and views of the members. He enumerated the projects of the society—a new research fund which will be used to finance independent research in illumination by universities; a handbook on illuminating engineers; an industrial lighting educational film, *Now You Can See*; recommended practices for school, industrial, office, store, residential, street and highway lighting; data sheets, educational courses; standards of nomenclature, testing specifications, recommended performance for luminaires.

The IES will no longer sponsor nor be connected with a lamp or luminaire certification program such as the "IES Lamp" but instead will provide performance specifications which any manufacturer may employ. Such certification, he said, will now be organized by the commercial group involved on an industry-wide basis. In every activity the IES will seek to raise the professional standards of the illuminating engineer.

The big programs of the lighting industry, Williams said, will look to the society for fundamental knowledge. Such knowledge, once developed, must be used, or the effort to obtain it will go wasted. If it is used, the engineer must have the assurance that it is correct. The society, he admonished, must take the time and pains to see that it is correct. In such knowledge-seeking the local chapters and sections of IES are expected to contribute. National recognition, he declared, can only be a summation of local work and recognition.

With new light sources and new applications, the engineer must know more than before, Williams said. He must learn more in shorter time. If all he sells is kilowatt-hours or fixtures, "I am afraid he will compromise with competition because he lacks information to provide illumination on its true merits."

EMEA Elects

Clarence R. Miller was elected president of the Electrical Maintenance Engineers Assn. of Southern California at its annual election meeting, Jan. 17. Miller is maintenance engineer for Western Precipitation Co. and has been a member of the board of directors of the organization for some time. He succeeds Julien H. Davis, consulting electrical and mechanical engineer.

Other officers elected were Nels E. Swanson, Goodyear Synthetic Rubber Co., former secretary-treasurer, first vice-president; Henry Bush, Littlejohn-Reuland Corp., second vice-president; Donald Byl, Union Ice Co., secretary-treasurer. Three new directors were elected for three-year terms; E. S. Reichard, General Petroleum Corp.; L. L. Warner, Douglas Aircraft Co.; John Zuponcic, Californian Shipbuilding Corp. The retiring directors were Walter Smoker, Lockheed Aircraft Co., Walter P. Ritter, American Can Co., and Walter R. King, National Biscuit Co.

Julien Davis, retiring president, also becomes a member of the board. He was presented a combination pen and pencil set as a token of appreciation by the membership. Under his leadership the constitution and by-laws were revised and the association was incorporated as a non-profit corporation.

As the educational sidelight of the meeting the sound film, *Unfinished Horizons*, was presented by the Aluminum Co. of America. It depicted the history of aluminum and the heartaches encountered in marketing the metal before the public became familiar with its possibilities.—*Henry Bush, editorial chairman.*

C. J. Shirley, Safety Switchboard Mfg. Co., San Francisco, presented a discussion and held a question and answer forum on *Prefabricated Wiring*, or bus duct and trolley duct, at the Jan. 25 meeting of the Electrical Maintenance Engineers Assn. of Northern California. Steve Gambel, consulting electrical engineer, was also present to answer questions. The second in the series of lessons on *Electronics at Work* was presented by Westinghouse.

Capt. William C. Eddy, commanding officer of the Navy's radar training center at Chicago, was the speaker at the Electric Club of Los Angeles, Jan. 29, talking on special electrical inventions that are aiding the war effort. He was presented by Howard L. Stolper, Stolper Electric Corp., Burbank. Robert Wilkin, Phelps-Dodge Co., presented to the club a copper kettle in which to collect fines, fashioned from scrap copper, brass and nickel salvaged from the U.S.S. Los Angeles, a new battle cruiser under construction.

Pacific Division, National Electrical Wholesalers Assn., will hold no annual meeting this year in conformity with the NEWA policy not to hold the annual convention this year because of travel and hotel restrictions on conventions ordered by ODT, according to announcement by J. P. Carson, Graybar Electric Co., chairman of the Pacific division.

Howard Scaife, regional manager, Edison General Electric Appliance Co., Inc., San Francisco, spoke before the San Francisco Pot and Kettle Club on *Tomorrow's Electric Kitchen*, at the Jan. 26 meeting. He was introduced by W. E. Derbyshire, Graybar Electric Co.

Tornado in a Box, a motion picture depicting the theory and operation of the gas turbine, was presented to the San Francisco Electric Club by James L. McClure, Pacific regional sales promotional manager of Allis-Chalmers Mfg. Co., at the Jan. 15 meeting.

Photographers caught up with Sam Williams (center), president of IES and editor of Electrical World, at Los Angeles, with R. J. Crump (left) chairman, Southern California Section, and George Rankin, regional vice-president

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Teamed for your Profit!

1. The finest in electrical wires and cables from ROEBLING

2. The best in service from ROEBLING ELECTRICAL WHOLESALERS

EVER STOP TO THINK that the best products in the world aren't very helpful unless you get them when and where you want them? And at the right price?

Thank your electrical wholesaler for that part of a job well done . . . even under the strain of total war, with increased demands and limited supplies.

That's why Roebling will continue to team up with electrical wholesalers now and always. We'll do our part of the job with a complete line of wire and cable that embodies every modern development and assures the best possible service. Roebling wholesalers will see that you get them, and hundreds of other fine electrical products too.

Roebling and your local wholesaler . . . it's a team that you can't beat when you want the best products and service. Teamed for *your* profit!

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TRENTON 2, NEW JERSEY
Branches and Warehouses in Principal Cities
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WEATHERPROOF WIRE • RUBBER COVERED WIRES AND CABLES • SERVICE ENTRANCE CABLES (INCLUDING THIN-WALL INSULATED BUILDING WIRES AND CABLES) • RUBBER INSULATED POWER CABLES • TROLLEY CONTACT WIRE RUBBER SHEATHED PORTABLE CABLES • VARNISHED CAMBRIC POWER CABLES BARE COPPER STRAND • PIGTAIL AND BRAIDED COPPER • MAGNET WIRE TELEPHONE WIRES

PACEMAKER IN WIRE PRODUCTS

Big Town Home Plans

PCEA aids six institutes in Los Angeles area

FIRST Home Planning Institute to be held in a large metropolitan area, a Los Angeles institute now under way is meeting with great success. An average attendance of more than 2,000 is present at six separate classes held in various parts of the city.

Classes opened the week of Jan. 15 and are held on Monday mornings at the Philharmonic Auditorium; Monday nights, Los Angeles High School; Tuesday nights, North Hollywood High School; Wednesday nights, Hollywood High School; Thursday nights, San Pedro High School; Friday nights, Manual Arts High School.

The course has a 10-week duration. Each meeting is two hours in length and presents two subjects of interest to prospective homebuilders. Adequate wiring is discussed by W. L. Stickel and A. B. Smedley, and lighting by R. A. Buckby.

The Los Angeles series is sponsored by the Division of Adult Education of the Los Angeles Board of Education, and is the outgrowth of institute programs begun about a year ago by the adequate wiring committee of PCEA.

Last month the sixteenth Home Planning Institute in southern California outlying territory was ended, while one was still under way in San Diego and 15 in central and northern California.

PCEA Dates

The wartime value of PCEA conferences led to the decision to hold them again this year. Meetings will be one day in length, to avoid straining hotel accommodations. To reduce demands on transportation, one meeting will be held in San Francisco for northern members, and one in Los Angeles for southern members.

Dates have been set tentatively for June 21 in Los Angeles and June 28 in San Francisco.

Programs of essential contemporary interest are being planned by the guidance committees of PCEA's three sections.

Preliminary work on a project which would be of great value to returning war veterans has been started by PCEA. The association's planning committee recommended to the board of directors that a training program be established which would serve as a refresher course for homecoming service men who had done electrical work previously. This would also have the incidental advantage of serving as basic education for new employees.

With the approval of the board, the planning committee is investigating the scope which such a course should cover, and the cost of organizing and conducting it. Details will be presented at the next meeting of the board of directors.

NC Contractors Change

Returned to the presidency of the Northern California Chapter, National Electrical Contractors Assn. was J. D. O'Connor, Lupen & Hawley, Sacramento, in an election from the board of directors at the annual meeting of the chapter, San Francisco, Jan. 26. O'Connor, who previously was president of the organization in 1938, succeeds Teo L. Rosenberg, Oakland, who has been president for the past two years. Tom Drury, Bakersfield, was named vice-president. Drury is at present president of the California State Builders Exchange. W. A. Cyr, ELECTRICAL WEST, honorary member, was re-elected secretary-treasurer.

Directors of the chapter, according to changes in the constitution during the past year, were elected by their districts in September. They are: T. L. Rosenberg, Oakland; J. D. O'Connor, Sacramento; Grover Grider, Stockton; Tom Robinson, Fresno; Tom Drury, Bakersfield; Carl Stolting, Santa Rosa; Ed Pierce, Vallejo; Seth Cohn, San Mateo; Roy Butcher, San Jose; Wesley Evans, Salinas, and George Abbett, Tom Harris, Joseph Carlson and Edward Dowd, all of San Francisco.

Although the board of directors in its meeting in the afternoon of Jan. 26, reviewed and approved the proposed changes in the by-laws which would establish three types of district organization for affiliating local associations with the chapter, the membership meeting that night withheld approval until a special committee reports on the finances and organization problem. However the territory of San Francisco, Marin and San Mateo counties was released to the San Francisco association for the formation of a chapter of its own if it desires to do so, providing it remains affiliated with the chapter.

H. H. Courtright, manager of the San Joaquin Power division of Pacific Gas and Electric Co. was unanimously made an honorary member of the chapter in a special resolution. The organization, now negotiating for uniform labor agreements throughout its area, voted a rule that all labor agreements be submitted to and approved by the directors of the chapter.

Galvin Presides Now

James Galvin of Galvin Bros., electrical contractor of San Francisco, was elected president of the San Francisco Electrical Contractors Assn. Inc., at its annual election meeting, Jan. 25, succeeding George Abbett, who has been president for the past four years. Galvin was vice-president during the past year.

Other officers and directors elected were: Tom Harris, H. S. Tittle Co., vice-president; Edward Scott, secretary; George Smith, treasurer; and George Abbett, H. C. Reid, Patrick Furlong, Century Electric Co.; Clyde L. Chamblin, California Electrical Construction Co.; Everett Carlson, Central Electric Co.; Ken Ryals, Stone-Ryals Electric Co.; and Bert J. Doherty, as directors.

The San Francisco association has applied to the Northern California Chapter, NECA, for release of the territory of San Francisco, Marin and San Mateo counties in order that it may form a chapter of National Electrical Contractors Assn. itself, affiliated with the Northern California chapter. Consideration is also being given to formation of an affiliate organization of radio service shops.

● C. W. MOWREY has been appointed manager of the San Diego County Chapter of National Electrical Contractors Assn. He makes headquarters at 13th and E streets, San Diego, where he also manages the merchant plumbers association. Post office box address is Box 896.

● A. EMERY WISHON is a new member of the board of directors of PCEA, filling the unexpired term to June 30, 1946, of the late P. M. Downing.

Midwinter conference of the Rocky Mountain Electrical League's utility division was held in Denver, Jan. 26, followed by a luncheon at the Cosmopolitan Hotel and a meeting of the executive committee in the afternoon, presided over by F. F. McCammon, Public Service Co. of Colorado, president. A meeting sponsored by the dealer division was called by Ray Jones, chairman of the division, and held Jan. 23. Electrical service and repair men in Denver and nearby towns attended to hear L. B. Bundy, of OPA, discuss *How to Adjust Service Charges to Meet Increased Operating Expense*. T. M. Foulk, chairman of the adequate wiring bureau, also spoke.

Utah Chapter, IAEI, discussed the Code at a recent round-table. D. J. Wolters, chief electrical inspector at Salt Lake City, was chairman of the meeting.

Electrical Contractors and Dealers Assn. of Sacramento elected 1945 officers at its Jan. 9 meeting. W. E. Camp is president, succeeding C. C. Buford; J. D. O'Connor is vice-president; Jack W. Thomas, secretary; C. S. Donley, treasurer; W. H. Welsh, business manager.

G.E. Offers

2-, 3- AND 4-CONDUCTOR

BX ARMORED CABLE

EASY TO INSTALL HIGH QUALITY

You'll like to work with G-E BX Armored Cable. The flexibility of its interlocking armor makes it easy to handle. Moreover, it has an s-shaped paper wrap which is easier to remove than ordinary wraps when stripping. This wrap separates the conductors from each other and provides additional dielectric strength, too.

G-E BX is ideal to use for complete wiring systems in small buildings of all types—houses, garages, stores, markets, etc. It is ideal also for wiring leads to factory machines and for extension wiring from conduit for any purpose. G-E BX is available with two or three conductors, sizes 14 to 2 or with four conductors, sizes 14 to 4.

G-E leaded armored cable, BXL, is also available in all desired sizes. Other G-E cables offered include 2-, 3-, and 4-conductor BraidX non-metallic sheathed cable and 2- and 3-conductor service entrance cable, Type SE.

* * *

FOR FURTHER INFORMATION on G-E BX or building wires or wiring devices see the nearest G-E Merchandise Distributor or write to Section CDW253-18, Appliance and Merchandise Department, General Electric Company, Bridgeport, Connecticut.

BUY WAR BONDS AND HOLD THEM

Hear the General Electric radio programs: "The G-E All Girl Orchestra" Sunday 10 p.m. EWT, NBC. "The World Today" news every weekday 6:45 p.m. EWT, CBS.

ADEQUATE WIRING WILL PLAY A VITAL PART

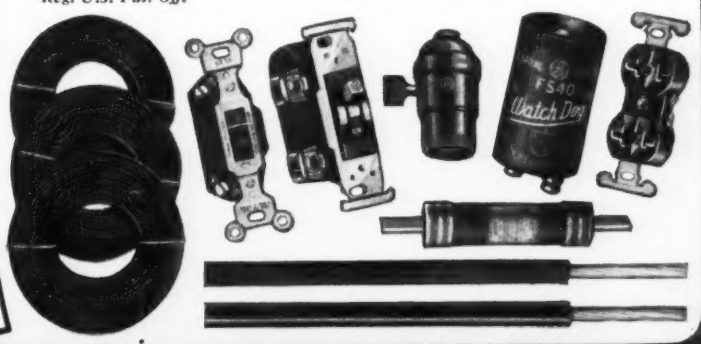
H. C. Rice, manager of domestic sales, Southern California Edison Company says, "People who plan to build homes after the war are thinking in terms of modern electrical development. Adequate wiring will play a vital part in making electrical conveniences available in postwar homes."

ADEQUATE WIRING SERVES ALL USES — THE KEY TO THE HOME OF TOMORROW

G-E BUILDING WIRES AND WIRING DEVICES

General Electric also offers building wires and wiring devices for every wiring need including Type SN and Type SNW small diameter Flamenol* Building Wire and many different wiring devices—switches, lampholders, outlets, etc.

**Reg. U.S. Pat. Off.*



GENERAL ELECTRIC

NEWS of the industry

CHASE SETTLEMENT OFFER BENEFICIAL TO PEPCO

A settlement by which the companies and their stockholders would receive benefits totaling three million dollars or more has been offered by Chase National Bank of New York in the suit brought against the bank by Portland Electric Power Co., its independent trustees and its subsidiary, Portland General Electric.

The litigation was instituted by Thomas Delzell and R. L. Clark, Pepco independent trustees, as an outgrowth of the stock manipulations of the Albert E. Peirce interests, which plunged the company into bankruptcy.

Under the settlement proposal, which was to go before the Federal District Court in Portland on Feb. 13, the New York bank would accept as full payment for loans and interest against Portland General amounting to $5,950,000, cash and shares totaling $3,765,000. The cash payment asked is $1,840,505 and the balance is made up of 53,500 shares of $6 preferred stock of Consolidated Electric & Gas Co., a PGE subsidiary.

Pepco is to receive $663,384 in cash from the bank, which also offers to pay $834,000 for 23,130 shares of Consolidated preferred held by the company. An indirect benefit to Pepco is ownership of the PGE common stock.

In addition, Chase has offered to lend Portland General $5,500,000 at 2% interest rate, which would serve to hold down the size of the proposed refinancing bond issue. In making this proposal, the bank commends PGE as among the nation's best managed power utilities.

Pepco 7% prior preference stockholders probably would receive the lion's share of the benefits in settlement of their claims, although increase in net worth of the companies may leave a margin for other preferred shareholders. It is estimated that reduction of annual fixed charges should increase PGE's net income in normal years from approximately $1,393,000 to $2,006,000 and that of Pepco from $1,234,000 to $1,403,000. Existing ban on payment of dividends on PGE capital stock owned by Pepco would be lifted automatically by the settlement.

Since the settlement would add to values of Pepco holdings, it would nullify Guaranty Trust Co.'s reorganization plan now before the courts (EWEST, January). Guaranty has been allowed to withdraw its plan and is expected to file a revision.

Meanwhile Pepco valuation hearings are before the district court in Oregon. Independent trustees have held for a value of about $35,000,000. Although Guaranty set a value of $27,500,000 in its original plan, the litigation settlement, if accepted, might bring this valuation to $32,500,000, enough to pay Pepco bondholders in full and leave some $6,500,000 for preferred stockholders.

Brownout Exemptions Granted on Coast

Before the Feb. 1 effective date for the brownout, exemption had been granted in the Pacific Northwest and in all sections of California except the San Diego area.

Pacific Coast power companies hope to be exempted from the coal-conserving national "brownout" which became effective Feb. 1 on an order from the WPB Office of War Utilities. Representations have been made to the OWU by both the Pacific Southwest and Pacific Northwest power pools to the effect that power surpluses exist in both areas and that no coal is burned in the production of electric energy. Major source of electricity is hydro and the principal fuels used are natural gas and hogged fuel or sawmill refuse.

The OWU order was based upon a request from James F. Byrnes, Director of War Mobilization and Reconversion, for steps which would immediately conserve the maximum amount of coal. The brownout would involve the following prohibited uses of electricity: outdoor advertising, promotional and display lighting; outdoor decorative and ornamental lighting; show window lighting; marquee lighting; white way street lighting in excess of the amount determined by local authorities to be necessary for public safety; and outdoor sign lighting except for directional or identification signs certified to be necessary for fire and police protection, traffic control, hospitals, doctors or similar community services.

The order is expected to save 2 million tons of coal annually.

● SALE of California Public Service Co. properties in Lake County, Ore. and Modoc County, Calif. to California Oregon Power Co. has been approved by the Federal Power Commission. Purchase price was $470,000.

CO-OP MEMBERS APPROVE PG AND E CONTRACT

Proposal of Pacific Gas and Electric Co. to furnish electric service to 800 rural homes in an area east of Fresno has been accepted by directors of the Foothill Electric Assn. following a vote by members on the question of choosing between PG and E service and an REA project. The vote was 193 to 141. In addition to members who voted in favor of accepting the utility company contract, some 201 residents of the area signed a petition urging the board to sign a contract with PG and E.

Action of the board culminated a drawn out battle between proponents of an REA project and those favoring service from the private company. The Foothill association was organized in 1941 and at one time applied to REA for a $260,000 loan. Under plans announced by H. H. Courtright, PG and E division manager, the company will spend approximately $470,000 to bring service to the 800 residents. Rates will be the same as those charged for rural service in other sections of the San Joaquin Valley.

Construction will commence as soon as WPB approval has been received and materials are available. Approximately six months will be required to complete the installation.

Southern California Edison Co. has agreed to furnish service to one section of the district which is within the service area of that utility.

● UPON REQUEST OF the utility, Western Public Service Co.'s complaint charging that the U. S. Bureau of Reclamation was subject to regulations governing utility companies was dismissed last month by the Wyoming Public Service Commission. The action originated last September when the USBR undertook construction of a power line to Monolith Portland cement and alumina plant south of Laramie. The utility contended that the construction was a public utility activity.

● DECREE of appropriation empowering the Okanogan County PUD to take over electrical distribution properties of Washington Water Power Co. has been requested of the county superior court. Negotiations for payment of the property, evaluated in condemnation proceedings at $2,227,531, have been completed, with sale of $2,702,000 in revenue bonds.

Even in 1906, we offered advisory service on power line construction...

Note this old report, dated June 14, 1906, covering the erection of 469,600 cm all-aluminum conductors. You see, even before A.C.S.R. was invented, our supervisors were on the job.

The custom has continued throughout all these years. Many line builders like to know that the eye of the cable manufacturer is also on the job. Alcoa's book of knowledge on line construction has grown plump.

By this means, too, Alcoa A.C.S.R. has been kept a leader in its field. Manufacturing and engineering standards have been continually upgraded, a successful system of vibration control developed, and so on.

This advisory service is available to all who plan to use Alcoa A.C.S.R. on their lines. For further information, write ALUMINUM COMPANY OF AMERICA, 2132 Gulf Bldg., Pittsburgh 19, Pennsylvania.

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Complete stocks at these points

LOS ANGELES SEATTLE
SAN FRANCISCO

PUD LAW AMENDMENT ASKED OF OREGON LEGISLATURE

Designed to tighten the Oregon PUD law, a bill to prevent districts from engaging in the power business outside their boundaries, without first securing consent of voters in the areas affected, was taken before the state legislature last month. The bill is patterned after one introduced in the 1943 legislature too late for action.

Laxity of the present law was brought home to many Oregonians in the Hood River PUD proposal, defeated by a small majority in January 1944. Under the $175,000,000 Hood River scheme, a small rural district would have been permitted to control electric systems throughout large sections of the state, including Portland. The district would have been sole arbitrator of policy and rates, since the state power commission has no authority over PUDs.

Hood River PUD Sponsors Formulate New Proposals

With a plan far less ambitious than the $175,000,000 proposal voted down last year, proponents of a Hood River PUD are again bidding for public support. The new plan is a cooperative, financed by members and customers, and with activities confined within district boundaries.

PUD supporters, who are circulating pledges for funds, state that an attempt would be made to buy facilities of Pacific Power & Light Co. within the district boundaries and, if that failed, competing lines would be built. The plan voted down in January 1944 contemplated take-over of all facilities of Pacific, Portland General Electric and Northwestern Electric companies and control of electric properties in large sections of the Northwest.

● FIVE POWER companies serving in the State of Washington were ordered by FPC to submit detailed reports on amount and accounting treatment of expenditures for political and related activities during the year, including those in connection with Referendum 25. Analyses of expenditures will supplement preliminary investigation made by the commission last fall at request of the Washington State Grange and public power groups. In making the original investigation, the commission pointed out that it was concerned only with the proper accounting of such expenditures.

● KITTITAS COUNTY PUD, Ellensburg, Wash. has been granted a loan of $60,000 from the Rural Electrification Administration.

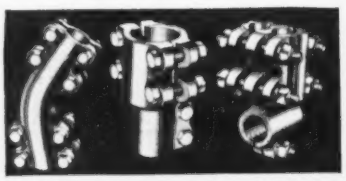
"When you need ANY Power Connector—

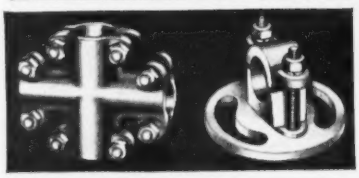
—see the **COMPLETE** line"

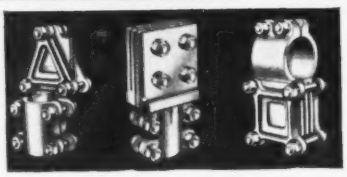
Probably the exact Power Connector you want is shown in the Penn-Union Catalog.

You will find Tee, Stud and End Connectors, Bus Supports, Terminals, Elbow and Cross Connectors, Couplers and Reducers—

—each in a wide range of sizes, up to the largest. Here are a few of the many types:







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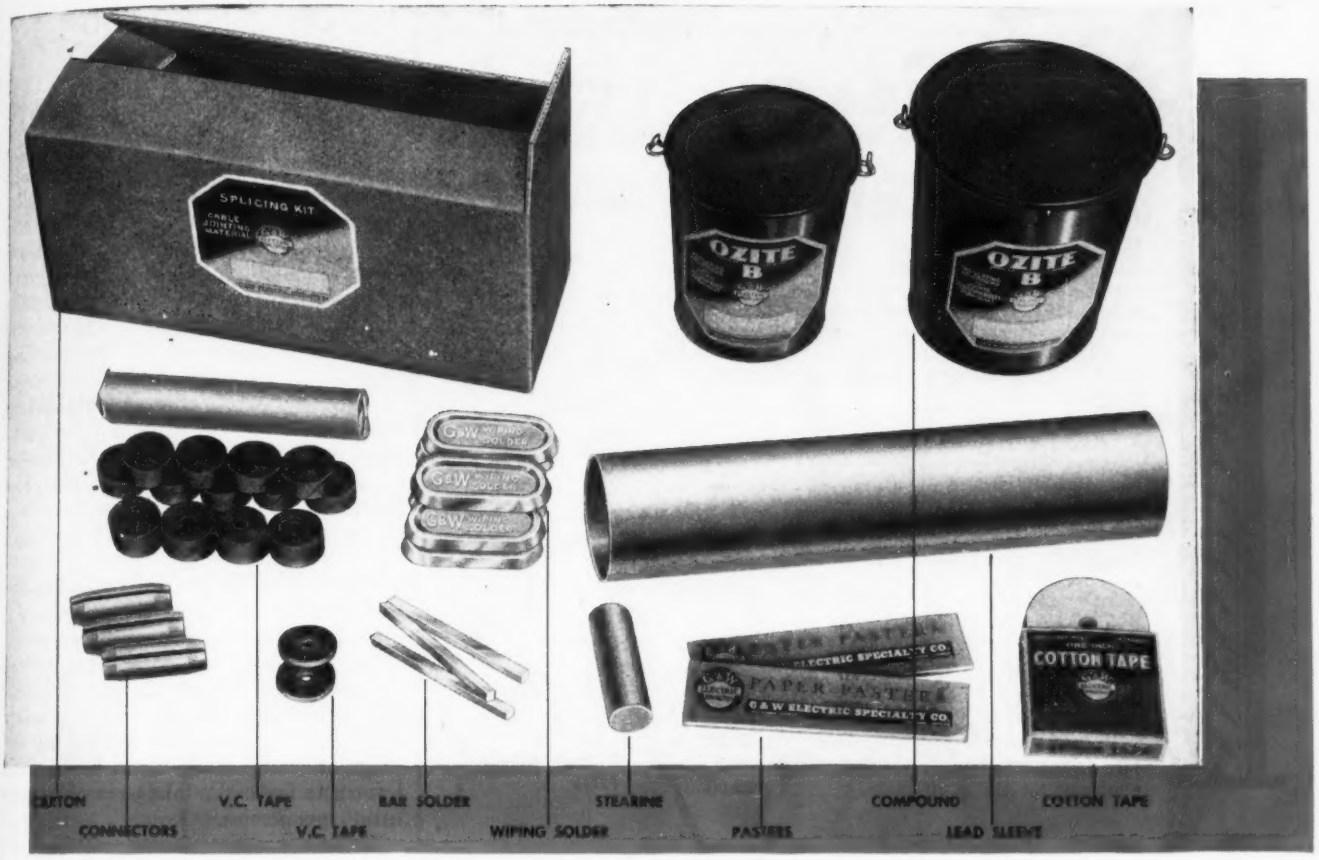

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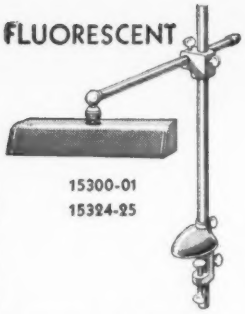

15300-01
15324-25

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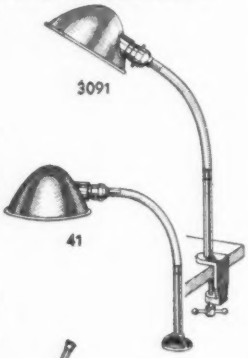

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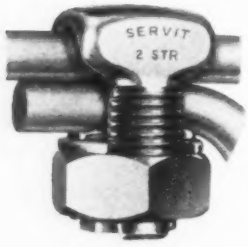

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PUD OFFICIALS VOTE TO PRESS CONDEMNATION

A resolution to institute suit to acquire power company properties in the area has been passed by Clark County (Wash.) PUD commissioners. A dissenting vote was given by Elmer Deetz, newly elected commissioner, who stated that present high values of utility companies make such a move inadvisable and that a less costly arrangement probably could be effected by delaying action.

The Seattle law firm of Houghton, Cluck & Coughlin has been retained to assist the district's attorney, D. Elwood Caples, in conduct of the suit. The Seattle firm reportedly has collected more than $140,000 in legal fees from Washington PUDs.

Clark County PUD is pushing the suit in face of recent setbacks at the polls. Clark County citizens registered a 15,217 vote (a 4,817 majority) against Referendum 25 last fall and elected Deetz commissioner, rather than his opponent, a member of the original three-man commission and known to favor the take-over of private utility properties.

Utility property involved includes distribution facilities of Portland General Electric, Northwestern Electric and Pacific Power & Light companies.

Oregon County Will Vote Again on PUD Measure

Renewal of efforts to form a Public Utility district in Linn County, Ore., are being made by sponsors of the movement who late in January elected A. L. Carnegie, master of Linn County Pomona Grange, to head their organization.

With a PUD election scheduled for May 1946, it was decided to exclude Albany, the county seat which voted against the formation in past elections, and Lebanon from boundaries of the proposed district. The way was left open for inclusion of Lebanon later, however.

● A GRANT COUNTY Superior Court jury at Ephrata, Wash., recently set at $546,984 the "just price" which the Grant PUD should pay for Washington Water Power Co. properties within the county. The verdict was a compromise, but was closer to the PUD than to the power company figure. PUD appraisers had set a valuation between $380,000 and $405,000 with $10,000 severance damages, while the company had contended for $800,000, with $200,000 for severance. No mention of severance was made in the jury verdict.

LITTLE REFERENDUM PLAN SHELVED TEMPORARILY

PUD forces in the State of Washington have temporarily shelved a proposal to submit to the legislature at Olympia a "Little Referendum 25," as a substitute for the bill rejected by the voters in November by a 75,000 majority. This was announced by Bernard Pearce, executive secretary of the PUD Information League, following a conference of PUD leaders headed by Pearce with Governor M. C. Wallgren, at which members of the house and senate public utilities committees were present.

Pearce explained that, in view of new negotiations for the purchase of Puget Sound Power & Light Co. properties initiated by Guy C. Myers, New York promoter, PUD groups, including Grange leaders, had decided to withhold the proposed bill pending the outcome of such negotiations. It is conceded that any attempt to revive Referendum 25 through the medium of the legislature might meet with stiff opposition, due to the heavy majority piled up against the measure in November.

The new proposal calls for division of the state into three "public utility district authorities" rather than the over-all commission proposed in Referendum 25, and would empower the PUDs to negotiate contracts with organized labor and assure labor special security benefits. It would make mandatory the publishing of private utility rate schedules for a PUD that had received a condemnation award; prohibit a PUD from condemning municipally owned power properties; require a referendum vote on questions of acquiring private power property by a municipally owned plant; outlaw a condemnation award unless the PUD receiving it acts upon it within one year of the final legal appeal.

Bonneville Asks $4,200,000 Appropriation for Year

To operate and maintain the Bonneville-Grand Coulee transmission system during the fiscal year starting July 1, 1945, an appropriation of $4,206,690 has been asked, according to Bonneville Power Administration officials. Total expenses will amount to less than one-fifth of Bonneville's estimated annual gross revenue of $22,000,000, it was reported, leaving over 80% of gross revenues for payment of power costs and repayment of federal investments in the Bonneville and Grand Coulee systems. Unexpended appropriations made for projects deferred due to war conditions will cover a portion of operation and maintenance costs.

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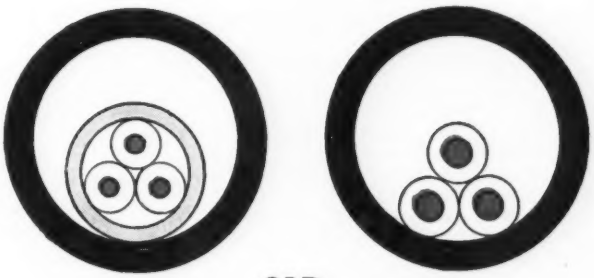

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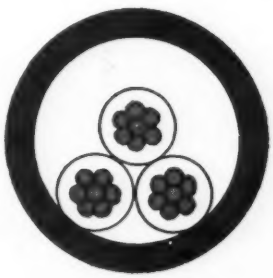

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RATE REDUCTIONS ORDERED FOR VANCOUVER ISLAND

Reduction of basic electric rates for the southern area of Vancouver Island was ordered by the British Columbia Public Utilities Commission, effective Jan. 1. It is estimated that the reduction will mean a total saving to consumers of $112,000 yearly, or approximately 10% of the average householder's monthly bill.

During the past two years, under the rate dividend plan the utility has supplied power free for two months in the southern Vancouver Island area and one month in other areas served. Presumably, if a similar free period is declared next year, the southern area, through the general reduction, will be placed on the same basis as the rest of the territory.

City Light Superintendent Would Reject Rate Appeal

Superintendent E. R. Hoffman of Seattle City Light last month recommended to the city council that it reject the Navy Department request for a reduction in power rates to two Naval installations and two shipyards. In requesting a reduction to meet Bonneville wholesale rates, a Navy representative had threatened to bring federal power direct to the installations, if the rate adjustment was not made (EWEST, December).

Hoffman stated that, in making a reduction, all customers, not one, must be considered and pointed out that Bonneville has no lines into Seattle. City Light would not transmit the power over its lines solely for the benefit of four installations, he said.

Power Use Up, Revenue Down, Washington Report Shows

Residential electric users in the State of Washington gained more electricity to the dollar spent in the year ended Sept. 30 than in any of previous record, according to the Department of Public Service.

The average monthly kilowatt-hour revenue from consumers buying from public and private companies fell from $1.73 to $1.69, a drop of 2.8 percent. At the same time, the number of residential consumers in the state rose from 495,847 to 510,641.

Total sales to all consumers showed a 12% gain during the year, climbing to $65,228,223. Of this total, public plant sales amounted to $30,478,136, a gain of 18.3% over the previous year, and private plant sales were $34,750,087, a 7% gain.

REDEDICATION

An Obligation to Our Fighting Men

DURING the last few weeks we have been forcibly reminded that so long as we still are fighting either of our major foes, first claim upon the productive resources of the United States—its manpower, materials, utilities, and industrial facilities—must be the production and delivery of munitions and war supplies. All other claims are secondary. No responsible citizen would have it otherwise. For in this war even more is at stake than our existence as a Nation. We dare not forget that we are engaged in a struggle that challenges the fundamental values upon which our civilization has been built.

It is not easy to list the values that we are fighting to uphold. They have been clothed in a variety of shapes over the centuries. They will assume new forms in the years ahead. But they have an inner consistency that free men the world over can feel and recognize: the right of the commoner against the noble, the right of the individual against the state, the right of trial by jury, the right to vote, the right to an education, the right to freedom of speech and worship, the right to work in a sphere of one's own choosing, the dignity and the equality of the individual under the law—these are our cultural heritage, painfully won and often precariously held over the ages, always to be rewon, redefined and buttressed by each succeeding generation of men.

The preservation of this vital core of value, and its transmission to our sons and daughters depends upon our victory in this struggle. So those things which are essential to victory must come first. And since the production of war munitions in overwhelming volume and quality can hasten that victory and save countless lives of our fighting men, no effort that will contribute to this end should be regarded by us as a sacrifice.

☆ ☆ ☆

The present is no time for self-congratulation upon our achievements either in the theatres of battle or of production. The mounting casualty lists should suffice to curdle the savor of any such indulgence. The most that can be said in reasonable taste and good conscience is that performance in both fields is such as to warrant our firm confidence that we can carry to successful completion the tasks that remain to be done.

Nor is there profit in even observing, much less deploring, that the tasks ahead are more formidable than those which were defined for us a few short months ago. Then, all of us—military leaders, government officials, workers, and business men—were riding a crest of optimism as to an early end of the war in Europe and as to the character and dimension of the war against Japan. Already we had begun to turn anxiously toward the problems of reconversion which then seemed so near at hand. Schedules for war production, based upon the best available estimates of need, called for a 5 billion dollar reduction from 1944 performance, even though we might have to continue a two-theatre war, and for a 40 percent reduction in the event of an early victory in Europe.

Today, those forward estimates have been revised sharply upward. That is true both of the 1945 requirements to meet the needs of a two-theatre war, and of requirements for the Pacific war once the European phase is ended. For this upward revision four chief reasons are responsible:

1. European battle experience has shown markedly greater use of expendable munitions than was provided in the formulae upon which our original production schedules were calculated: the result has been a depletion of inventories on a scale that would become dangerous if allowed to continue.
2. Experience has also demonstrated the need for new types of weapons or increased complements of some existing types to match new enemy equipment or tactics.
3. A less easy optimism as to the early ending of the European war has given rise to a growing disinclination to gamble on the approximate date.
4. An increasing conviction prevails that the war against Japan may require ground-army operations on the Asiatic mainland on a scale greater than originally premised.

But if these changes in the fortunes and outlook of war have raised our estimates of military requirements, may not subsequent favorable changes in the military situation cause them again to be revised downward? It is entirely possible. But our military men have learned that they cannot safely discount what *might desirably happen* as something that *will happen*. Those working on the production front also must learn that lesson. Fortunately, the record shows that we have been able to maintain a war production almost equal to that of the rest of the world combined, even while we produced for civilian use on a scale that has been large even by our

own pre-war standards. So we have ample margin to whip whatever war job may be required of us. As now defined, the task will not be easy. But it *can* and *will* be done.

☆ ☆ ☆

What, then, is the production task with which we are charged? Our 1945 production for the two-theatre war now calls for the substantial maintenance of the over-all levels reached in the latter months of 1944. But there is a shift of emphasis. Almost half of the programs for specific equipment items are declining. A few are scheduled to hold level. About 45 percent are scheduled to rise sharply. That means that workers and facilities must be shifted to man the expanding programs. At the same time the armed services are calling for many more men than can be supplied from those who become newly eligible to the 18 year old age group. That means further drafts upon war workers. It means also replacements for them when they are taken from the expanding programs. Finally, events demand that we produce as much as possible of many items during the first half of 1945.

Our task, then, is one of intensified effort for the immediate future, with multiple readjustments at a stage when adjustments are hard to make. Materials for which demand was easing as pipe-lines were being drained in anticipation of falling schedules again are tight as the pipe-lines are being refilled to meet augmented requirements. Men, women, and facilities must be shifted from less essential to more essential tasks. What must be done will be done. But unless there is much voluntary accommodation, it will be necessary for us to suffer a formidable amount of governmental direction which none of us likes, many of us deeply resent, and all of us, when personally affected, volubly protest. The more we police ourselves, the less we shall be policed.

☆ ☆ ☆

Even after Germany has been defeated, we shall still face a far from light production requirement to continue the war against Japan. As currently defined this phase might require war expenditures at something like $70 billions a year, an over-all reduction of approximately 20 percent from the $89 billions spent in 1944. Reduction in munitions output would be somewhat greater, probably from 25 percent to 30 percent below 1944 levels. But it is important for us to acknowledge that the reduction is going to be substantially less than the 40 percent previously estimated.

Only a few months ago there were those who questioned sharply the possibility that we might need 60 percent of current munitions output to win the Japanese war. Now the judgment of the military is that 70 percent will be none too high.

Actually the latter level would represent an increase of little more than 50 percent above what now is being produced for the Pacific area. This, certainly, is a modest estimate when we reflect that we shall inevitably more than triple the Army forces assigned to that theatre.

Such a program probably would give us a current munitions supply from three to four times that produced by Japan, but it is believed that we shall need that much to compensate for the advantages derived by Japan from the fact that she will be fighting a defensive war, from the volume of her accumulated stores, from her prepared positions, her shorter lines of supply and transport, and from her large troop reserves, the bulk of which we have yet to meet in battle. Certainly our present 3 to 1 production edge over Germany does not appear to be excessive.

The more modest V-E Day cuts contemplated by the present plan will mean a less acute reconversion problem when they are made, but will leave a greater one to be met at the end of the war. They will mean probably a net increase of not more than 4 million workers available for civilian work during the transition period. Their orderly absorption should present no embarrassing problem. Indeed, we now are warned by Washington that war production following V-E Day may require the protection of considerably closer control than was contemplated under the 40 percent cuts previously expected.

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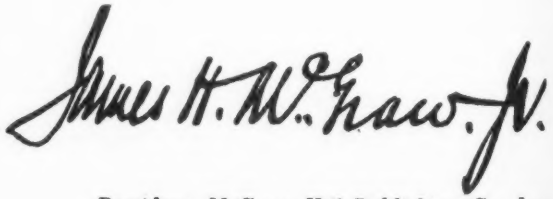
In short, we face for the immediate future a more difficult production job. It is made the more formidable by the fact that we had dulled the keen edge of our will to produce by our premature expectation of a reduction in requirements. Now we are told that the trend of war production for the immediate future is up, that it is unsafe to discount the date of victory in Europe, and that the amount of leeway for reconversion after the defeat of Germany is less than had been anticipated.

Accordingly, we must rededicate ourselves to the task of driving war production up. We must do without some of the things that we have enjoyed on the civilian front rather than demand more of those things; we have still to devote our abilities and energies first and foremost to the demands of war.

Whatever will assure and hasten victory must have first place in any statement of American policy.

Without victory, our aims, and the underlying values upon which they are based, will be extinguished, blotted out by the opposing aims and values proclaimed by our enemies.

The needs of our fighting men must be put first. For, unless we win the war, the National aims and policies of the United States will cease to have meaning in the world.



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QUADRANGLE				X	X	X
OVERBAGH & AYRES				X	X	X
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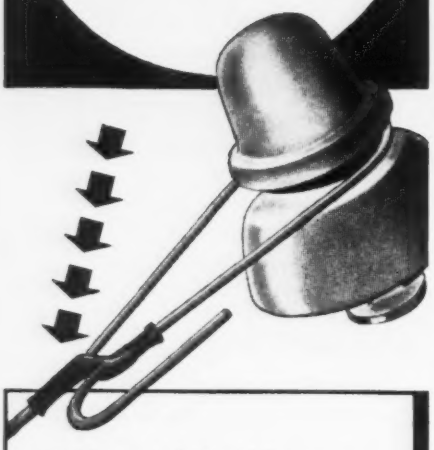

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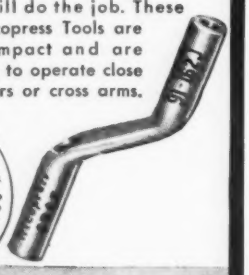

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ARMY ENGINEERS STUDY DIVERSION PROPOSALS

Plans to divert waters of the Klamath and Pit rivers near the Oregon-California border into the headwaters of the Sacramento River above Shasta Dam were announced last month by the U. S. Army Engineers. Diversion assertedly would provide even flow of water into the dam, augmenting hydroelectric power generation and supplying additional irrigation water for northern California.

Opposition to the proposal was registered by the California Oregon Power Co. and by mining, recreational and farming interests. O. G. Steele, Copco vice-president, protested that resulting reduction of water available at Copco Lake intake would cut power output to several Oregon and northern California communities.

Diversion was first proposed 20 years ago. The several plans under consideration now include a proposal to tap the Klamath near the border and channel water to the Sacramento near Weed, and one to divert waters from Tule River, east of the Klamath, to headwaters of the Pit River, which converges with the Sacramento above Shasta Dam. USBR regional officials favor diversion from the Trinity River, which flows into the Klamath near the Coast from the south.

With hearings scheduled in Eureka, Calif., and Klamath Falls, Ore., the U. S. Engineers indicated that, what had begun as a simple diversion plan, might become a project for development of the entire upper Klamath basin, including hydroelectric power, flood control, irrigation reclamation, fish and wildlife.

B. C. Electric Planning New Transmission Ring

Under consideration by B. C. Electric Railway Co. is the construction of a high-voltage double-circuit transmission ring supplying distribution points located in the Burrard Peninsula area, Lulu Island and in parts of the Coquitlam district. According to preliminary plans announced by Tom Ingledow, vice-president and chief engineer, at a recent joint meeting in Vancouver of engineering groups, the circuit would be approximately 30 miles in circumference and would be partially overhead and partially underground cable.

At the same time, Ingledow stated his belief that Vancouver would have to continue to buy power from the United States for a considerable number of years. In 1943 attempts were made by B. C. Electric to proceed with its Bridge River power development, he pointed out, but authority was refused at first, approval coming too late to carry out the work. It has been postponed until after the war and excess requirements of the lower mainland area are being supplied from the United States.

LaGrande Plant Reported Nearing Completion

Date when the city of Tacoma, Wash., will receive first electric power from the enlarged LaGrande plant of the $23,000,000 Second Nisqually project was tentatively set as early February by Chief Engineer Verne Gongwer, when contractors failed to meet the Dec. 31 deadline schedule set last October.

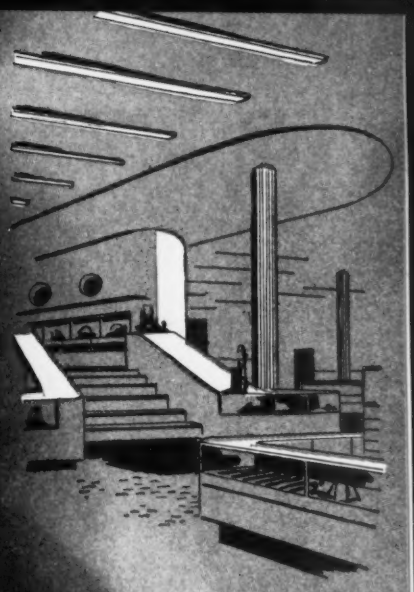
Fears that recently completed Alder Dam will fill before completion of the LaGrande tunnel, causing water to spill at a further loss to the city, also were expressed by Gongwer in a report to Tacoma Utilities Commissioner C. A. Erdahl.

Scheduled to be completed over a year ago, the project has cost the city nearly $2,500,000 more than originally planned. In his recent report, Gongwer expressed the opinion that a tendency toward minor economies by the contractors, without regard for the city's great losses, has been the chief reason for delay, rather than a shortage of labor.

● PURCHASE of three leases from Portland General Electric Co. to Crown-Zellerbach Corp. has been made by Hawley Pulp & Paper Co. of Oregon City. Lease transfers divest Crown of all interest in property rented from PGE east of the center line of the Willamette, principally affecting a steam power plant, Mill H, the Hawley sawmill and some grinders. Leases involve use of land, water rights and machinery installed at the lower end of the dam at Willamette River Falls, for many years a source of power at Oregon City. Rights of Crown in a June 1920 lease from PGE for water to generate 2,172 hp. are protected in the agreement, however.

● ERECTION of a new substation will be undertaken by the West Canadian Hydro Electric Corp., Vernon, B. C. at a cost of $40,000. The work will be started as soon as necessary priorities are secured and will be completed, according to present plans, by July 1. T. M. Gibson, superintendent, reports that the new substation will raise the capacity from 1,500 kva. to 3,700 kva. The company completed an extensive power development expansion program at Stave Falls about a year ago.

Preview of Tomorrow



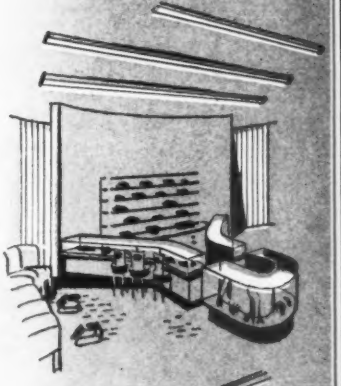
8 FT

MITCHELL'S

Longfellow

POEMS OF LIGHT

UTILIZING THE NEW MAZDA "SLIMLINE" LAMPS



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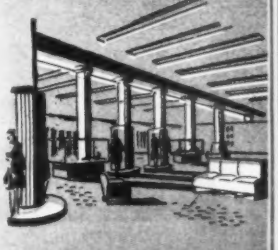
Mitchell, as always, is conspicuously *first* in introducing new and better lighting equipment. *Mitchell* quality and *Mitchell* design are recognized as unsurpassed in the fields of commercial and industrial lighting equipment.



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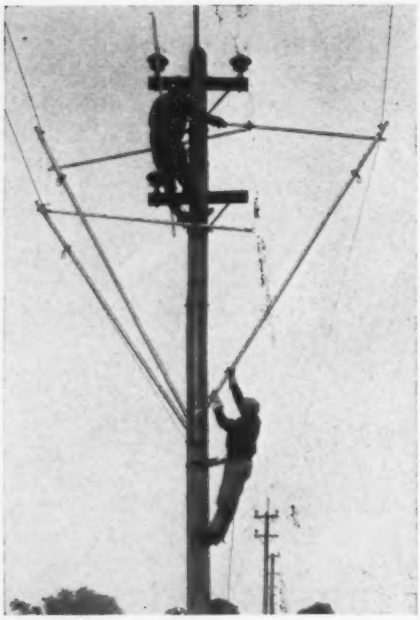

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When you get to the point of tool selection and ordering you'll find complete details on what to buy and how to use it in your Tips Tool Catalog.

CONSULT THIS BOOK

A-B-CHANCE CO. INDUSTRIES CENTRALIA MISSOURI

UTILITY PLAN BENEFITS EMPLOYEES IN SERVICE

A plan for supplemental compensation for service men's dependents was announced recently by Idaho Power Co. through its president and general manager, C. J. Strike.

Effective Jan. 1, the supplemental compensation is based on the amount of government pay and the number of dependents in relationship to the wage received by the man in service when he was working with the company. The schedule favors the lower paid non-commissioned men and those who were in the lower wage brackets while with the company.

Generally speaking, the plan provides no benefit where government pay and family allowance exceed the amount earned while with the utility, since the real purpose is to provide supplemental income to those whose pay is insufficient to meet living expenses of dependents.

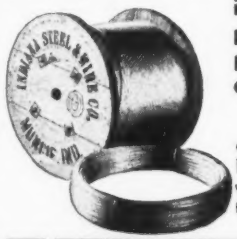
To be eligible, an employee must have completed at least six months' service with the company prior to induction and must have taken the full limit of war risk insurance. Only those supporting dependents are covered.

Under the plan, if base pay for the last full year amounted to $1,500 or less, the company will pay an amount sufficient to bring the total income, including government pay and family allowance, to the amount of his base pay in his last full year; plus 75% of the next $1,000 of last annual base pay or portion thereof; plus 50% of the next $2,500 of annual base pay or portion thereof. A minimum of $15 per month will be paid.

Christmas checks, representing a lump sum equal to $15 a month for all past service in the armed forces, were sent to those eligible to benefit under the plan. At the beginning of the war, the company adopted the practice of providing an extra month's pay to regular full-time employees upon their induction into the armed forces. It also provides hospitalization and surgical fee benefit coverage to dependents.

● Seattle City Light on Jan. 17 celebrated its fortieth birthday. It was on that date in 1905 that the city-owned utility took over the street lighting system and began delivering electricity from a 3,200-hp. hydroelectric plant on Cedar River. City Light revenues for 1944 were approximately $9,750,000, highest in the department's history. Its plant investment, and money available for investment, now amounts to approximately $82,500,000, more than half of it already paid off, according to Superintendent Hoffman.

ALL the strength and durability inherent in steel are combined—with definite economies—in *Crapo* Galvanized Steel Strand. Heavy, ductile, tightly-bonded zinc coatings, applied by the famous *Crapo* Galvanizing Process, provide lasting protection against corrosion.



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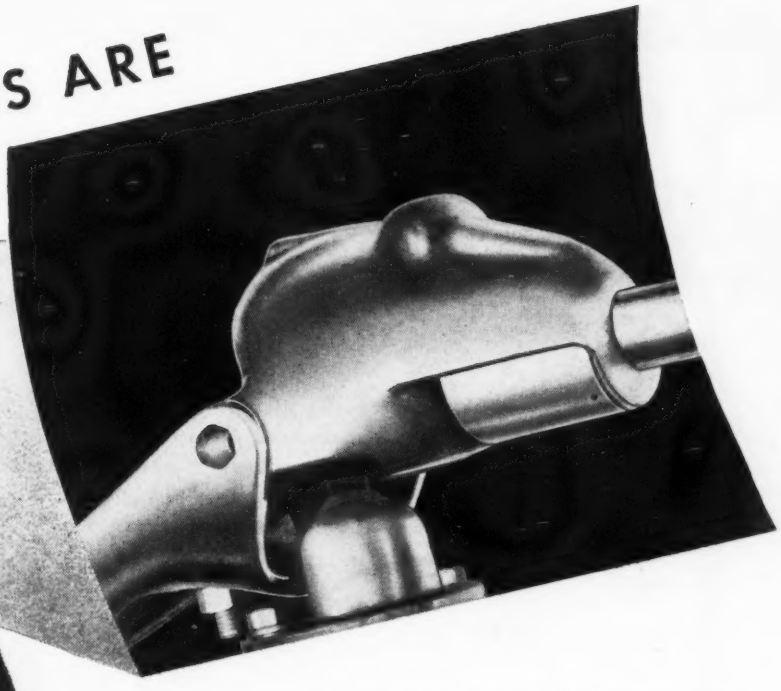

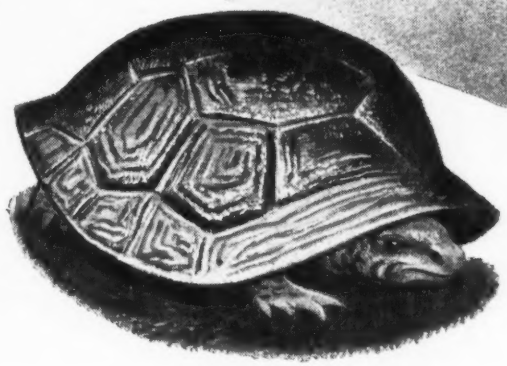

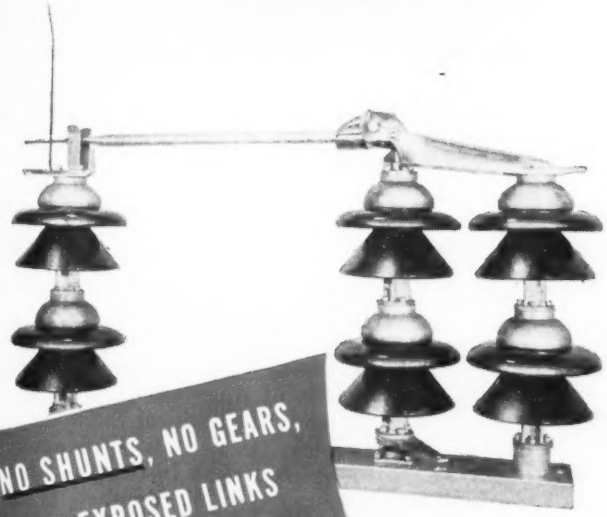

Type V Outdoor Disconnecting Switch rated 600 amperes, 69 kv.

... Opens and closes under all service conditions, new Westinghouse Type V Disconnecting Switch is fully protected against elements and corrosion.

Here is a new idea in a disconnecting switch . . . a complete enclosure of vital moving parts. Heavy ice and corrosive formations will not "freeze" switch in open or closed positions.

There are *only three moving* parts, for reliable and simple operation, capable of opening and closing the switch easily under any weather conditions.

Regardless of the length of time between switch operations, the Type V Disconnecting Switch can be opened and closed smoothly and with minimum effort. Contact pressure is released *completely* before the upward movement of the arm begins, breaking any ice or corrosive seal that might have formed. On ratings 46 kv and above, a strong counterbalancing spring aids lifting of arm.

Maintenance is reduced to periodic inspections. Contacts are self-cleaning. No adjustment is necessary after installation. There are no shunts to corrode and break.

Ratings are from 7½ to 230 kv, 400 to 2000 amperes. For complete information write for Booklet B-3480. Westinghouse Electric & Manufacturing Company, P.O. Box 868, Pittsburgh, Pa. J-60571

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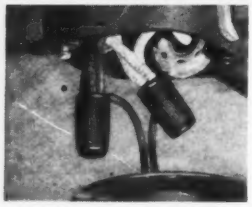
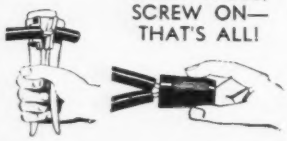


STRIP WIRES, SCREW ON— THAT'S ALL!



The new low prices still further reduce the cost of making wire joints in wiring of factories, buildings, homes, etc.

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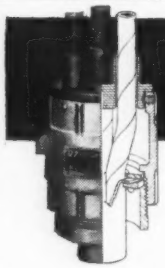

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PUGET SOUND SOCIETIES FORM JOINT COUNCIL

Engineering and technical societies in Seattle and vicinity have banded together to form a joint council to be known as the Puget Sound Council of Engineering and Technical Societies. The member groups are local sections or chapters of national societies, most of them with local headquarters at Seattle and membership in western Washington or, in some cases, throughout the state.

Purpose of this council is to provide a medium for cooperative action by the member societies on matters which are beyond the scope of the individual organizations; to foster a more general recognition of engineering and associated professions; to provide means of more effective public service; to promote the welfare of the state; and to cooperate with other organizations having similar objectives.

The council is patterned after the National Engineers Council for Professional Development and is similar to councils in other large cities, such as the Oregon Technical Council in Portland. It will represent the engineering profession in a manner similar to that in which the State Bar Assn. represents the lawyers and the State Medical Assn. represents the doctors.

Architectural, engineering and technical societies which have joined in establishing this council and their representatives are: Western Washington Chapter of American Institute of Architects, LaMonte Shorett, Ralph Decker; Seattle Section of American Institute of Electrical Engineers, N. A. Carle, R. E. Kistler; Seattle Section of American Society of Civil Engineers, Richard Ellis, A. L. Miller; Western Washington Section of American Society of Mechanical Engineers, R. L. Rockwell, F. B. Lee; North Pacific Section of American Institute of Mining and Metallurgical Engineers, J. B. Umpleby, D. L. Pitt; Washington Section of American Institute of Chemical Engineers, R. W. Moulton, J. L. McCarthy; Seattle Section of Institute of Radio Engineers, L. B. Cochran, E. H. Smith; Pacific Northwest Chapter of American Society of Heating and Ventilating Engineers, D. C. Griffin, C. W. May; Washington Chapter of Illuminating Engineering Society, C. T. Bakeman, B. A. Travis; Seattle Section of Institute of Aeronautical Sciences, C. E. Rutledge, R. H. McElroy; Washington Branch of Society for Promotion of Engineering Education, H. J. McIntyre, R. Q. Brown; Tacoma Section of American Society of Civil Engineers, C. A. Strong, Ralph Finke.

It is expected that other engineering

and technical societies will join the Council and that the membership will include approximately 20 societies, with a total membership of about three thousand engineers and architects.

Nathaniel A. Carle was elected chairman. He is well qualified to represent various branches of engineering; is a member of the American Society of Civil Engineers and a fellow of the American Institute of Electrical Engineers and onetime national vice-president of the electrical engineers. Carle is a former Seattle city engineer and former chairman of the Seattle Board of Public Works; is now with the Puget Sound Bridge & Dredging Co.

Vice-chairman is Robert L. Rockwell, a consulting engineer in Seattle for more than 25 years and now regional engineer for the Smaller War Plants Corp. Secretary is Roy E. Kistler, assistant chief engineer for the Pacific Telephone & Telegraph Co. and the company's representative with the Army and Navy. Treasurer is LaMonte Shorett, who has been active in committee work for the American Institute of Architects, particularly in handling legislative matters.

The council will present unified views of the engineering profession on public matters to commissions or other public bodies. It plans to take an active part in planning and carrying out postwar projects; will be concerned in legislation having to do with code standardization, engineering licensing and other non-political matters; will help to re-establish in civilian life engineers returning from military service.

REA Lets Construction Contracts in West

Western construction contracts announced by the Rural Electrification Administration include:

Contract for construction of 56 miles of line and two substations for the Carbon Power & Light Co., Saratoga, Wyo. to Vance Electric Service, Salt Lake City, on a low bid of $59,487. Engineer is E. C. Porter, Denver.

Blachly-Lane County Cooperative Electric Assn. in Oregon has let contract for 15 miles of line to serve 45 members to L. H. Leonardi Co., San Rafael, Calif., on bid of $17,082. T. C. Smith, Corvallis, Ore., is engineer.

Tice Electric Co., Portland, will build 43 miles of 33-kv. line for Douglas Electric Cooperative, Roseburg, Ore., for $121,416. Flora Engineering Co., Cheyenne, is engineer.

● Offices of the Bonneville Power Administration's Puget Sound district have been moved to 1331 Third Ave. Building from the Smith Tower. The move was to provide additional office space, according to Paul W. Hand, Puget Sound manager, who reported that deliveries of Columbia River power into the region increased from 963,000,000 kwh. in 1943 to 1,660,000,000 kwh. last year.

● Bonneville Power Administration has released a preliminary report on the plastics industry in the Pacific Northwest. The report, which was prepared as a part of the Bonneville marketing program, is available in limited quantities from the BPA division of industrial and resources development in the Guardian Bldg., Portland.

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The "Uni-Crimp" is a universal solderless terminal of simplified one-piece design which provides maximum mechanical strength and conductivity. It is fully interchangeable with other terminals of this type and can be quickly installed with hand crimping pliers or mechanical indenting tools already in use.

Standard sizes carried in stock. For terminals of special size, finish, etc., a letter to our engineering department submitting your specifications or requirements will receive prompt attention.

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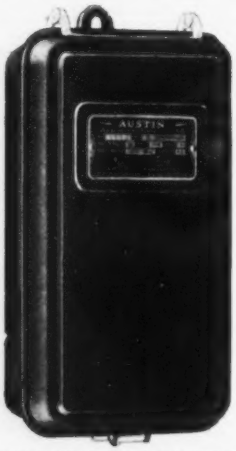
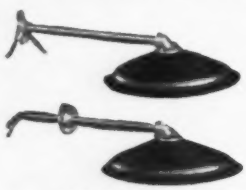
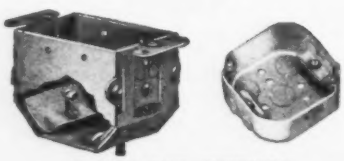


POULTRY HOUSE LIGHTING TIME CONTROLS

ELECTRIC FENCE CONTROLLER



YARD LIGHTS



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PEOPLE
made this news

Edison Company Names New Vice-Presidents

Tice

Additional officers of the Southern California Edison Co., all from the present management organization, were elected Jan. 19 by the board of directors. Those advanced were E. R. Davis, N. B. Hinson, Gail C. Larkin, Ralph R. Walbridge, R. C. McFadden, H. W. Tice, R. G. Kenyon and O. V. Showers.

Davis, assistant general manager since 1932, was elected vice-president and assistant general manager. He is distinguished as one of the foremost construction engineers in the electric utility industry and was one of the chief engineers of the Edison Big Creek-San Joaquin River hydroelectric development. His activity in the electrical industry of southern California dates from 1896 and he has been identified prominently with the advancement of technical phases of electrical engineering and operation.

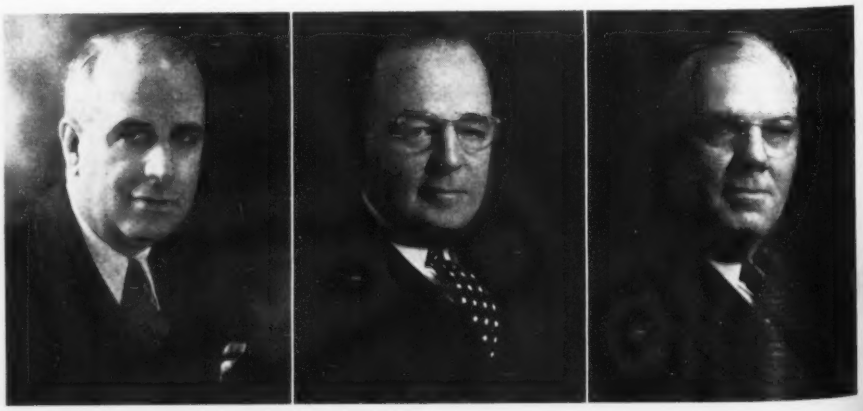
Hinson, who likewise has been closely identified with the operating and engineering of the company for many years, was elected vice-president and executive engineer. He is chairman of the Pacific Southwest Power Interchange Committee and has held a number of executive engineering positions in the company, with which he first became identified in 1906. He was appointed chief engineer and chairman of the company's engineering committee in 1934.

Larkin, a member of the Edison organization since 1922 and general counsel since 1942, was elected vice-president and general counsel. He will continue as directing head of the company's law department. Larkin entered the services of the company as an attorney in the law department and became assistant counsel in 1937, assistant general counsel two years later.

Walbridge, commercial manager of the company since May 1939, was elected vice-president and will have charge of business development activities of the company. He has had wide experience in commercial affairs, both in the company's district organization and as a management officer. Walbridge first was employed in 1911 and served as manager at various times of several commercial districts until January 1939, when he was appointed assistant commercial manager in the general office.

Likewise as a member of the business development section, McFadden, sales manager since 1939, has been appointed assistant vice-president, to assist in the administration of commercial and new business activities of the company. McFadden has been associated with the company since 1916, first as sales engineer, later as district manager in several districts and subsequently manager of the commercial new business department. Since the beginning of the wartime expansion of industry, he has had direction of the

Walbridge Kenyon Hinson



3 QUESTIONS

AND ANSWERS THAT EVERY ALERT ENGINEER WILL APPRECIATE

1 Q: WHY IS THE KUHLMAN CONSTRUCTION OF B.I. (BENT IRON) CORE TO BE PREFERRED FOR SMALL SIZES?

A: A designer of a Kuhlman B.I. Transformer is not handcuffed. He may use any shape of core—Round—Square—or Rectangular, (as shown in Fig. 1 A, B & C) or any shape of window, Short—or Long, (as shown in Fig. 2 A & B,) that in his judgement fits the particular conditions.

This is a distinct advantage to the designer when certain performance characteristics must be attained. The designer is not compelled to sacrifice some other characteristics such as exciting current, reactance or excess weight.

2 Q: WHAT'S WRONG WITH THE OLD TYPE CORE?

A: In the first few years of automobile manufacturing the old conventional steel having a tensile strength of 60,000 pounds was the only steel available and designers were compelled to pile on volume and weight to make the product stand up. But when alloy's having a tensile strength of 100,000 pounds became available the designers reduced the volume and weight of cars without sacrificing strength or utility of the manufactured product.

Just so with the steel that makes up the cores of transformers. The Cold-Rolled steel has improved magnetic qualities but must be magnetized in the proper direction which can only be done when the material is bent around the corners (as shown in Fig's 4 & 6). The Kuhlman B.I. core was the first of such constructions made available to the public which utilized the advantages of the improved qualities of Cold Rolled magnetic steel. (The old conventional construction is shown in Fig's 3 & 5).

3 Q: WHY SHOULD A PURCHASER PREFER B.I.?

A: Kuhlman started the ball-a-rolling ten years ago—and today more than 75% of all small distribution transformers (25 Kva. or smaller) are of the B.I. type or a modification which utilizes the advantages inherent in cold-rolled steel for cores.

In buying a Kuhlman B.I. core transformer you get a transformer that uses the highest grade materials available and one which uses those materials to the best advantage.

KUHLMAN ELECTRIC CO.

BAY CITY • MICHIGAN

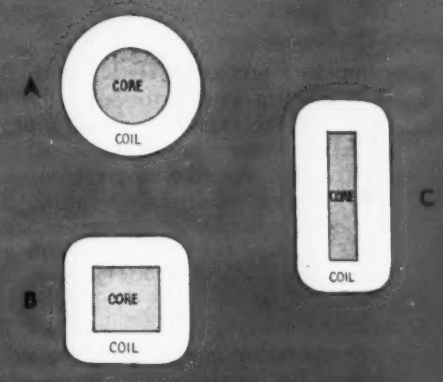


Fig. 1

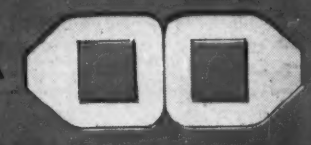


Fig. 2

Fig. 3

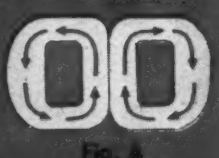


Fig. 4

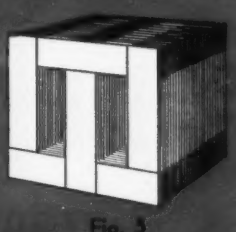


Fig. 5

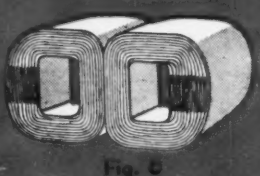


Fig. 6

company's service in supplying industrial electric power to meet the demands of this rapidly expanding phase of the company's business.

Tice was elected vice-president and will continue to direct operation. He has been manager of operation since 1941. Before his affiliation with the Edison company in 1922, he was identified with the electrical manufacturing and steel manufacturing industries, became operating engineer for the company in 1927 and assistant manager of operation ten years later.

Kenyon, assistant vice-president since 1942, and former advertising manager, was elected vice-president and will continue in charge of industrial relations for the company, the activity in which he has been engaged. He first was employed by the company in 1917 and became advertising manager in 1932, after serving in the accounting, securities and employment departments.

Showers, assistant secretary of the company since 1917 and a member of the company's investment department, was elected secretary to succeed the late Clifton Peters. Before his association with the company in 1917, Showers was identified with the Henry E. Huntington interests, as secretary of several of the Huntington companies and later as secretary of the Pacific Light and Power Corp. before consolidation with the Edison company.

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Lighter — Stronger — Improved Throughout

- Completely redesigned electrically.
- Lighter, stronger internal clamp work.
- New improved tank.
- New deep drawn high tension bushing pockets affording protection to high tension bushings.
- Lugs for double through-bolt pole mounting or hangers.
- Double electrically welded tank.
- Shot blasted.
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Gardner transformers are growing in popularity because they are designed to meet the needs and convenience of the user.

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Gardner Electric Mfg. Co.

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Operating Organization Changes Are Announced

Three major promotions in the operating organization of the Southern California Edison Co. took place on Jan. 19, according to the announcement of H. W. Tice, vice-president in charge of operation.

W. E. Row, assistant manager of operation for the past three years, was appointed manager of operation. He has been associated with the company's operations for 27 years and has held a number of positions of responsibility, including distribution engineer, electrical engineer, assistant superintendent of distribution, and superintendent of distribution.

W. L. Chadwick was advanced from the position of chief civil engineer to that of manager of the engineering department. A veteran of 18 years with the Edison company, his experience has been varied in engineering phases of operation.

W. N. Johnson, former superintendent of distribution, was appointed assistant manager of operation. He served as manager of the Edison company's Vernon City district and has been superintendent of distribution for the past four years. He was at one time chief engineer of the city of Vernon.

Other recent changes in the Southern California Edison Co. include:

Advancement of H. V. Busby, former assistant commercial manager, to commercial manager. Busby joined the company in 1919 and has been manager of a number of districts, as well as assistant division manager and division manager.

L. F. Hunt has been promoted from senior electrical engineer to chief electrical engineer, and R. W. Spencer, former civil engineer, becomes chief civil engineer. J. D. Enefer has been made assistant to the manager of the engineering department.

C. T. Malloy, former superintendent of transmission and communication, has been appointed general superintendent in charge of transmission, distribution and communication.

C. M. Cavner is now assistant and C. E. Heath is administrative assistant to the manager of operation.

E. N. Husher has been advanced from assistant superintendent to superintendent of distribution. R. N. Coe and P. M. McCann are assistant superintendents of distribution.

C. E. Moran becomes superintendent of substations, with H. L. Rudolph as assistant superintendent.

C. W. Sanders has been named superintendent and D. Z. Bigler, assistant superintendent of transmission. A. M. Burnett becomes superintendent of communication.

Three PG and E Men Given New Responsibilities

Appointment of Henry H. Buell as northern area superintendent and advancement of Sam Bowman and C. S. Hale to fill resulting vacancies at Stockton and San Jose were announced recently by Pacific Gas and Electric Co.

Buell had been San Jose division superintendent in the electric department since 1922. He went to work for PG and E in 1911, following graduation from Stanford and a year in the Panama Canal Zone; left in 1920 for two years' government service in Washington, D. C.

Bowman, who succeeds Buell at San Jose, was on the staff of Western States Gas & Electric Co. when it became a part of the PG and E system in 1927. He was made assistant superintendent of the electric department at Stockton and in January 1931 became superintendent of underground and substations in that division.

Hale has been transferred to Stockton to take over Bowman's former responsibilities as underground and substations superintendent. With the company and its predecessors for more than 30 years, Hale most recently had been assistant superintendent of the electric department, San Jose division.

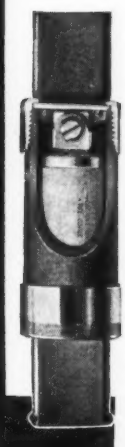
● Pacific Gas and Electric Co. has appointed Lee C. Wise, district agent in charge of electric and water properties at Willits, Fort Bragg and adjacent areas in northern California recently acquired by the company. The new territory will be operated as a part of the Santa Rosa district under supervision of A. A. Clark, district manager. Wise has been with PG and E since 1930 and recently had been commercial agent of the St. Helena and Calistoga area. His new headquarters are at Willits.

● Frank R. Sherwood on Jan. 1 became assistant manager of purchases and stores for Pacific Gas and Electric Co. Sherwood went to work for Great Western Power Co., a PG and E predecessor, in 1912 as clerk and was advanced first to chief storekeeper, then to general storekeeper and finally to assistant purchasing agent, the title he held when PG and E took over the company in 1930.

● R. W. Wagner, for three years electrical engineer at the Mead reduction plant of the Aluminum Co. of America, has been appointed to a similar position in the company's Pittsburgh office. Wagner was to assume his new duties on Feb. 1. James B. Pittman, electrical engineer at Torrance, Calif., was to succeed him in Spokane.

SOLDIERS of PRODUCTION

The spectacular production job America is doing is one of the miracles of all time. TRICO "Powder-Packed" Renewable fuses and KLIPLOK CLAMPS are protecting production schedules against unnecessary shutdowns and lost production. It's a 100% trouble-free combination.



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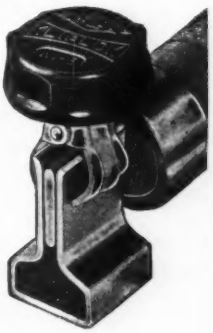

KLIPLOK CLAMPS

Lock fuses and clips together. Bad contacts cause no end of worry and expense. Install KLIPLOCKS and eliminate burnt fuses, premature blowings, unnecessary shutdowns and wasted current.

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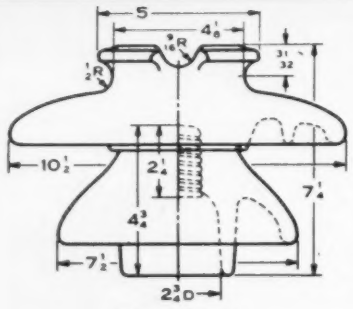

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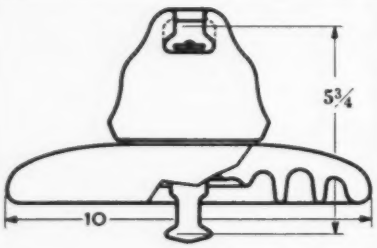
45 Kv. Rating

Dry Flashover	125 Kv.
Wet Flashover	85 Kv.
Rec. Pin Height	8 In.
Std. Pkg. Crate	6

This insulator generally used on 33 Kv. can also be furnished in one-piece design (No. 1924). Mechanical, thermal and electrical characteristics are well balanced insuring long life in service.



NO. 21243
15,000 Lb. Min. Combined M. & E. Rating

Dry Flashover	80 Kv.
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Leakage Distance	11½ In.
Std. Pkg. Crate	6

This design is offered in a wide range of spacings in both Ball-Socket and Clevis types which fulfill all strain insulator requirements.

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LISBON, OHIO

Hurd to Join Bonneville Staff; On Leave from TVA

Clarence J. Hurd has been given a short-time leave by TVA and will join the staff of the Bonneville Administration temporarily. He will assist in development of a comprehensive program of research and education to encourage full utilization of Columbia River power in agricultural, domestic and commercial fields, according to Bonneville Administrator Paul J. Raver.

Hurd is a native Oregonian and a graduate of Oregon State College, Corvallis, where he served for four years on the agricultural engineering staff of the experiment station. He also has been engaged in commercial agricultural engineering.

He joined the TVA staff in 1936 and is now in charge of the authority's agriculture engineering development, including research and educational programs on utilization of electricity on farms and in development of special farm machinery to assist in soil conservation practices.

Graybar Makes Personnel Shifts in Northwest

Graybar Electric Co. has announced personnel appointments in the Northwest. Effective on Feb. 1, J. P. Lawton became district commercial manager of the company's Northwestern district, with headquarters in Seattle. Lawton, who had been Des Moines manager, replaces J. H. Kelly, who has retired following 38 years of service with the company.

R. D. Hyneman has taken over the duties of Portland manager, succeeding S. G. Ward, retired. Ward had been with the company for more than 40 years. Hyneman has served the company in Tacoma and Seattle; had been office procurement advisor at Portland prior to his advancement.

● J. B. Dearment has been made traffic manager of the lamp department, General Electric Co., at the Oakland factory. He has been in charge of the Oakland warehouse for the past three years. He will be succeeded in the latter by W. A. Ruehl.

Tenney to Handle Norge Sales in Western States

Appointment of J. M. Tenney as Western sales manager for the Norge division of Borg-Warner Corp. was announced recently by M. G. O'Harra, vice-president in charge of sales. Tenney joined the company in 1929 as Los Angeles sales manager and was successively eastern sales manager, New England divisional and regional manager, southwest refrigeration representative, southeastern regional manager and refrigeration sales manager.

In his new position, Tenney will have charge of sales in the eleven Western states. The appointment was made in recognition of the growing importance of the Western market, O'Harra said.

● Charles Stoeckly has been promoted to Pacific district motor specialist by General Electric Co. He will be attached to the staff of the district manager of the industrial division and will supervise motor division product sales in California, Nevada and Arizona. His headquarters will be in San Francisco, where he has been located for several years.

● Robert D. O'Neill, former commissioner of public utilities for the City of Tacoma, has been appointed manager of the Pacific County Public Utility District. He succeeds the late William Fribley.

● Karl G. Kempf has been appointed Pacific Coast manager for the Thomas & Betts Co. Kempf has been the company's Los Angeles district manager.

Did you say NO CRANKING?
I said
NO CRANKING!
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GROUND RESISTANCE TESTER

New model for extremes of wet and dry conditions. Four ranges: 0-3, 0-30, 0-300, 0-3000 ohms. Self-contained power source. **No cranking necessary.** Direct readings. No calculations required. Accurate. Speedy. Light portable unit for railway signal departments, telegraph and signal fields, radio broadcasting stations, public utilities, R.E.A. projects—wherever ground testing is essential. Write for descriptive Bulletin.

Model 255 Vibroground

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Westinghouse Supply Names New Managers in California

Three new managers for Westinghouse Electric Supply Co. have been appointed in the northern California area in a move preparing for postwar business, it was announced recently by Charles R. Mathews, northern California district manager.

J. C. Williams was appointed northern California district stores manager. Formerly Oakland branch manager, Williams has been associated with Westinghouse since 1923 and has held positions in the warehouse, general office, quotations department and was a salesman until 1942.

Henry N. Muller, formerly northern California district credit manager, has replaced Williams as Oakland branch manager. He joined Westinghouse in 1926 after three years with the Holtermann Electric Co.

John B. Harvey is new district credit manager after having served as assistant credit manager for Westinghouse Supply Co. in Los Angeles. After working with the Illinois Electric Co. at Phoenix, Ariz., he served as office manager of Westinghouse's Phoenix branch and in 1939 was transferred to Los Angeles.

● HOWARD H. BULLOCK has been named General Electric manager at Phoenix, according to announcement of S. E. Gates, Los Angeles manager. Bullock succeeds Loys Griswold, who is leaving for Honolulu to join the American Factors Ltd. and its subsidiary, W. A. Ramsay, Ltd., G-E sales agents in the Hawaiian Islands. He had been in the company's Los Angeles office, handling special assignments for the industrial and central station departments. Previous to his advancement, he had been assigned to special work on jet propulsion at the Flight Test Base in Muroc, Calif.

● E. J. "TED" CROSBY has resigned as publicity director for the Washington Water Power Co. and will join his brothers in Hollywood. A brother of Bing Crosby, he will be the last of the Crosby family to leave Spokane, regarded by all as their hometown. For ten years assistant to the director of customer relations, in 1938 Crosby was named to head the Washington Water Power personnel department, an outgrowth and substitute for the customer relations department. He later became publicity director.

● UNITED STATES RUBBER CO. has appointed W. M. Ballew southwestern sales manager, in charge of mechanical goods sales in several branch offices including the Denver branch.

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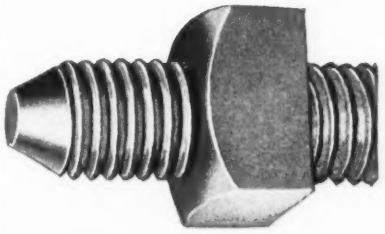
KORTICK IMPROVED POLE STEPS—1/2" drive head, strong cross section, driving surface centered—blow force reacts directly to point, reinforced bottom, no bending or distortion while driving, Fetter drive threads



KORTICK "HANDIPOINT" BOLTS save time, have greater salvage value, can be installed quickly, removed without damaging threads. Supplied on ALL Kortick Crossarm Bolts, Carriage Bolts, Eye Bolts, Guy Rods.

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For Dependable Soldered Connections

You get a perfect solder joint every time when you use Sherman Lugs, because we take a lot of pains to see that Sherman Lugs are clean, bright, and free from grease — inside as well as outside.

To prepare them for good soldering, Sherman Lugs, after they are made, are first tumbled in sawdust. Then they go through a special acid cleaning bath (bright finish) which removes all traces of corrosion, dirt, grease or other foreign matter. After that, they are rigidly inspected to make sure that every individual lug is perfect.

Sherman also has complete facilities for hot tinning and electro-tinning.

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Split Bolt Connectors
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Armor Rod Clamps
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DEATHS

Clyde E. Houston

Clyde E. Houston, 62, vice-president and general manager of the Southern California Edison Co., died Jan. 8 at his home in San Marino. His unexpected death was caused by heart failure. He had been in apparent good health except for a slight cold which had kept him from his office for several days.

Mr. Houston was president of the Los Angeles County Fair Assn. and a director of the Pacific Coast Electrical Assn. He was president of PCEA for the 1940-1941 year.

A veteran Edison executive, Mr. Houston had been with the company 40 years. He had been vice-president and general manager since 1942, having been named vice-president and assistant general manager in 1940. Previous positions he had held included assistant general manager, commercial manager and assistant commercial manager.

Mr. Houston started with the electrical industry in the days of the Edison Electric Co., predecessor of the Edison company of today. He was first employed as an inspector in the overhead department in Los Angeles on July 8, 1904.

He became superintendent of construction for the Ventura County Power Co. in 1906, when that utility brought under one head the electric companies serving Ventura, Oxnard and Santa Paula.

He returned to the Edison Electric Co. as a clerk in the Los Angeles district in 1908, a year before the name of the company was changed to the Southern California Edison Co. In 1912 he became foreman of the trouble department in the Los Angeles district, and a year later became assistant foreman of the Los Angeles overhead department.

After four years as foreman in the Redondo Beach district, he returned in 1919 to the scene of his earlier activities in the industry and served as district agent and later district manager at Oxnard.

He was district manager at Redondo Beach when he was appointed district manager at Pomona, a position he held for eight years. He was made eastern division manager in 1930, leaving there in 1932 to become assistant commercial manager in the Los Angeles general office.

● Clifton Peters, secretary of the Southern California Edison Co., died Dec. 29 of a heart attack at a meeting of the company's board of directors at

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the Edison Building, Los Angeles. He suffered the attack soon after the beginning of the meeting, and was dead when a physician arrived.

Mr. Peters was born Oct. 25, 1884, in St. Louis, Mo. He was a veteran of more than 34 years of Edison service, having joined the company on June 29, 1910, as a clerk in the general office accounting department. Two years later he was transferred to the executive department, where he was made assistant secretary. He was appointed secretary on July 1, 1922.

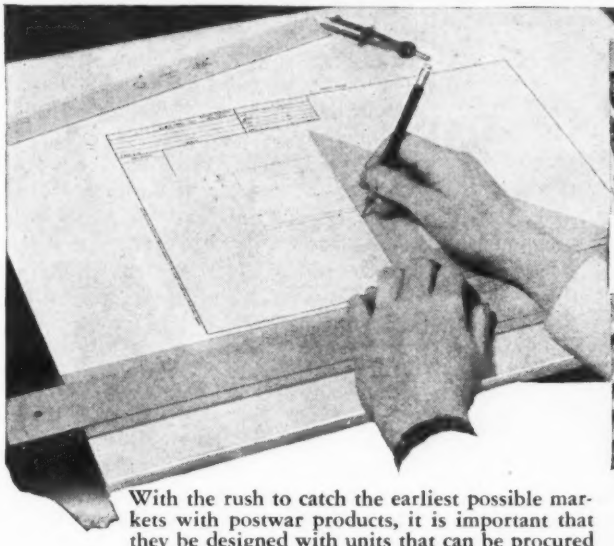
● WM. J. TRETHEWAY, electrical inspector for the city of Huntington Park, Calif., died Dec. 29 following a heart attack. Born in England November 1885, he came to America as a boy where he spent his boyhood in Leeds, S. D. Educated there, he later was employed as an electrical engineer for the Homestate Gold Mine Co. Fifteen years ago he came to California, was an electrical contractor in Huntington Park and in 1933 was appointed electrical inspector. Mr. Tretheway was a president of the Southwestern Section, International Association of Electrical Inspectors, during 1939 and was later chairman of the Southern California Chapter. A clear thinker and a good analyst, Mr. Tretheway was an asset to the inspectors' groups whose loss will be felt both by his section and the chapter.

● C. H. DELANY, assistant engineer of operations for the Pacific Gas and Electric Co. and a specialist on steam plants, died recently in California. Mr. Delany was born in San Francisco in 1874, attended the University of California and Cornell University where he majored in mechanical engineering. He went to work for PG and E in 1925, following service at the Mare Island Navy Yards and with Union Iron Works and Babcock & Wilcox. Mr. Delany was a skilled tennis player, taking part in many tournaments.

● THOMAS CARVER, designer of Seattle City Light's Diablo Dam in the Skagit project, and former assistant city engineer at Seattle, died in that city recently. He was a member of the American Society of Civil Engineers and was connected with the City of Seattle engineering department for 35 years. He retired in 1941.

● JAMES E. FORAN, for 21 years an electrical inspector in the Department of Electricity, San Francisco, died, Dec. 10. He had been an ensign in the U. S. Navy during the last war, joining the San Francisco department shortly after his return.

CONTROLS *FOR POSTWAR PRODUCTS*



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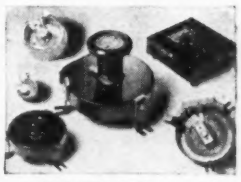

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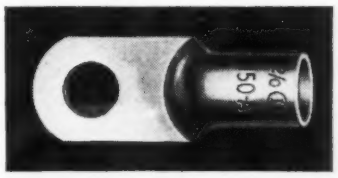

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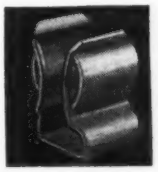

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PROFILES *of the month*

S. B. Maher, right, recently was appointed manager of G-E distributing branch in Los Angeles. He will be responsible for distributing branches in territory from Santa Barbara to Mexican border and east to Arizona line. Well known in the electrical appliance business, Maher formerly was with R. Cooper, Jr. Inc., G-E distributor in Chicago; was Cooper vice-president

Below, Los Angeles IES presents the "Sam Williams Class" of 15 new members to IES President Williams during his recent tour of the West. Williams is shown wearing the Mexican sombrero and serape, a gift from the section. Story of visit is found on p. 114

Graybar and Bendix officials map out the territory included in the distribution franchise recently awarded Graybar for Bendix home radio. Shown are J. J. Martineau, Graybar merchandise manager, J. C. Wilson, Pacific district manager, Bendix Radio; Sidney B. Cooper, newly appointed manager of Graybar's Salt Lake district. The distribution franchise also includes Utah, Idaho, Montana, northern and western Wyoming and parts of Nevada and Oregon

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